THE TRADE REVIEW

AND WESTERN MACHINIST.

WEEKLY EDITION, Vol. XVI—No. 52. } CLEVELAND, O., DECEMBER 29, 1883. { MONTHLY EDITION Vol. I.—No. 12.

New Machinery.

Thd Blakeney Cupola Furnace.

On this page we give a perspective view and explanatory cuts of the Blakeney Cupola Furnace, manufactured by the Blakeney Foundry Co., Springfield, O. The object of this furnace is to give iron uniform strength in passing through the cupola by projecting and distributing the air in the furnace in such a manner as to produce uniform heat. The features peculiar to the above furnace are as follows:

First—By the introduction of a combination of curved tuyeres or chutes shown in figure 1, placed upon the wall or lining of the cupola, and forming part of the wall, a proper distance from the bottom and nearly surrounding the inner and outer sides of the wall as shown in the sectional view Fig. 2. The tuyeres are made of cast iron and in sections for convenience of handling. A blank space is left in the rear of the cupola two feet wide, through which the slag is blown, if required.

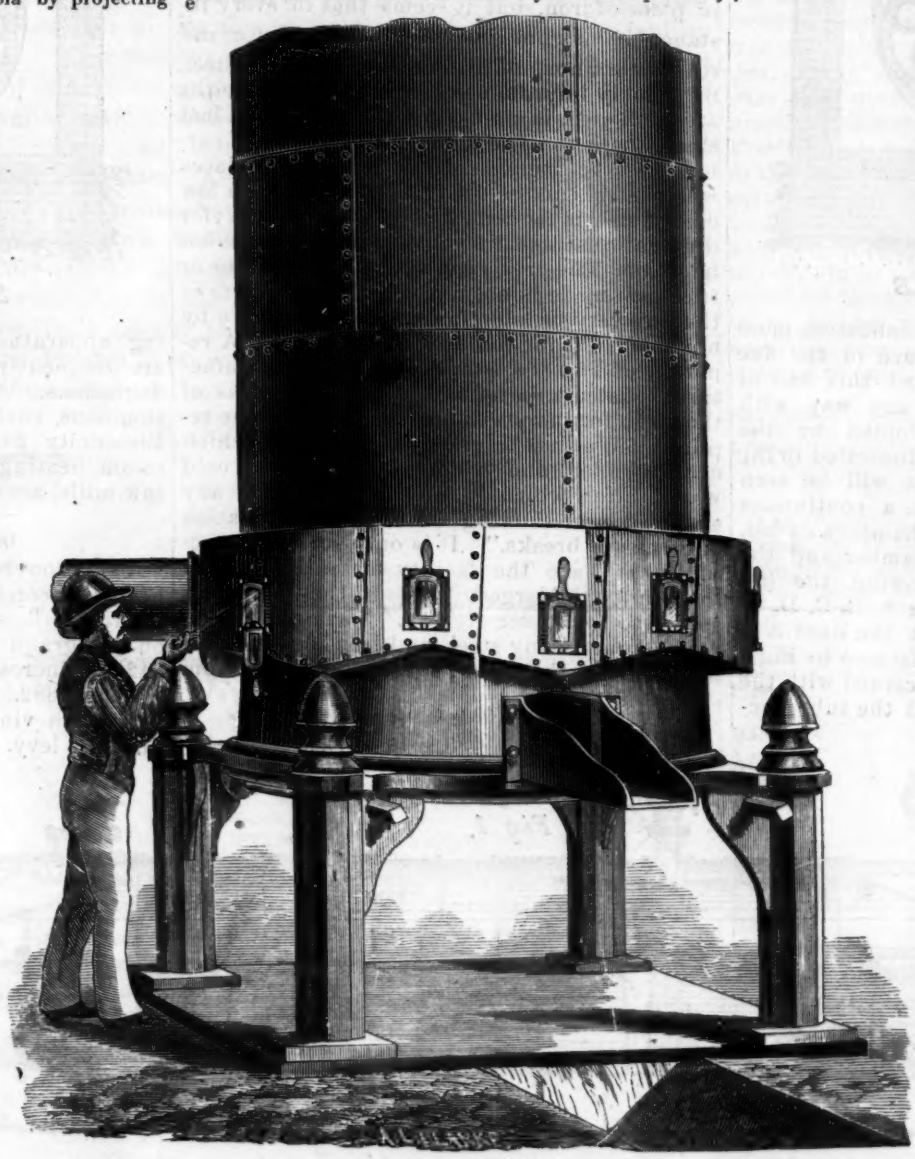
Second—By a chamber or case extending around the cupola and enclosing the space in which the air is conducted to the tuyeres. The bottom of this chamber, made irregular in form, hollows at suitable intervals to allow the metal to flow to the escape openings, in case it overflows through the tuyeres. The openings are closed with fusible plugs of lead or other material to be melted out by the molten metal. The blast is conducted to this cupola through one pipe, and striking the blank space sidewise in rear of chamber passes all around through the curved tuyeres in to the center of the furnace, the blast striking into the cupola every $\frac{1}{8}$ of an inch horizontal, and five and three-fourth inches perpendicular, or according to diameter of cupola.

As a producer of a uniform grade of iron for the purpose of casting car-wheels it is just what is needed for the different grades of iron to prevent chill cracking.

This Cupola with its many advantages has also rows of shelves bolted to the shell four feet apart up to the top of the charging door, so that it will not be necessary to tear out any of the lining except that which is burned out. These cupolas have run eighteen months with heavy heats without being relined.

The heat of the furnace has no effect on the tuyeres, as the blast keeps them cool.

The advantages claimed for this cupola are; Rapidity in melting; economy in fuel; great saving in labor; no hanging or clogging in cupola and uniform strength of iron. Catalogues can be had on application.



THE BLAKENEY CUPOLA FURNACE.

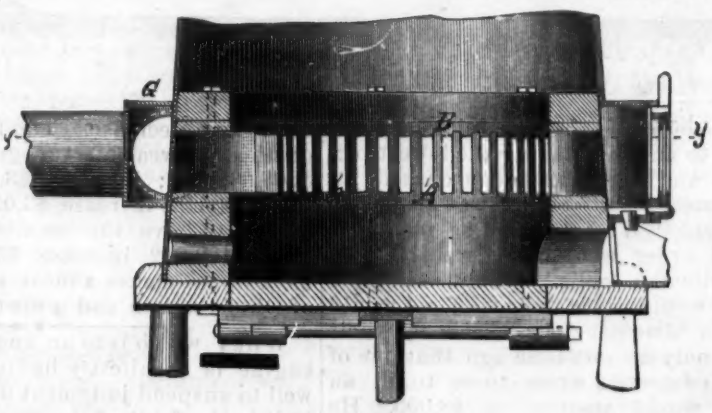


FIG. 1.

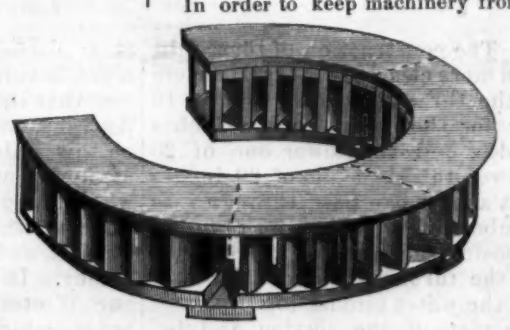


FIG. 2.

OHIO'S CANAL SYSTEM.

Figures for the Past Year.—Falling off in Receipts.

The forthcoming report of the Board of Public Works will show that the canals of the state have cost much more than the revenue. The reasons for this are given, and should there be no further mishaps from the elements the revenues for future years will probably quite well well repay the labor of maintaining them. The receipts and expenditures have been as follows:

Miami and Erie canal	$ 88,938 12
Ohio canal	44,873 52
Muskingum improvement	16,590 69
Hocking canal	3,633 47
Walhonding canal	920 42
Total collections	$155,016 22

The disbursements have been $220,035.45, leaving a deficiency of $65,019.23. The special appropriations and what was at hand at the beginning of the year, amounted to $248,290.40. The Miami and Erie canal was the only one that paid its own way, having a surplus of $11,009.03.

The heavy expenses were made upon damages caused by the floods of the past two years, and the dams and locks have been put in excellent condition—better than for many years before, so that there will be no necessity for such large expenditures. Had it not been for this, the canals would have shown a surplus of nearly or quite $50,000.

Boiler Insurance.

In steam boiler engineering the only observable change seems to be the slow but steady gain made in the introduction of water-tube coil boilers and sectional boilers, and in the extension of a rational system of inspection and test while in operation. To-day the intelligent owners of boilers secures inspection and test, with insurance, by intelligent engineers, and responsible underwriters, as invariably as he obtains inspection and insurance of his buildings. Under this system, steam boiler design, construction and management, is becoming a distinct art based upon real knowledge. The system of forced circulation proposed by Trowbridge and others seems to me likely to prove useful in the solution of the problem today presented.—[Thurston.

It is said that cast iron pulleys may be lagged or faced without the use of rivets, in the following manner: First brush over the face of the pulley with acetic acid, which will in a short time rust it, and give it a very rough surface; then attach the leather to the pulley, with a cement composed of one pound fish glue and one-half pound common glue, cooked in alcohol and water. This would seem to be worth trying, at least.

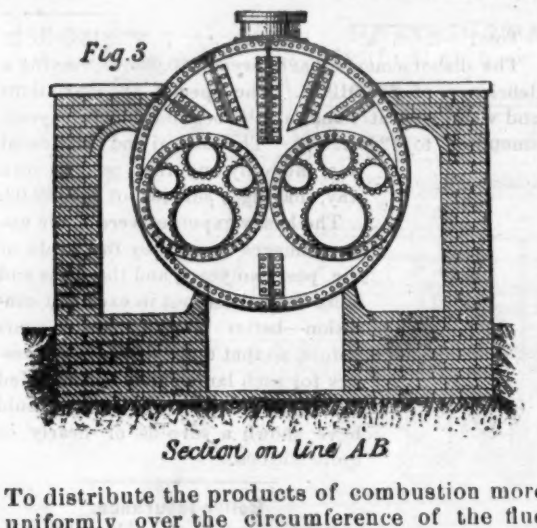
In order to keep machinery from rusting, take one ounce of camphor, dissolve in one pound of melted lard; take off the scum and mix in as much fine black lead as will give it an iron color. Clean the machinery and smear it with this mixture. After twenty-four hours rub clean with soft linen cloth. It will keep clean for months under ordinary circumstances.

The percentage of coke produced from a ton of coal in this country is about 80.

A New Type of English Boiler.

From the Textile Recorder, Manchester, Eng., we take the following description (with accompanying cuts) of a new type of boiler recently exhibited at the Oldham Fine Art and Industrial Exhibition, by the Oldham Boiler Works Co. Limited. Referring to this boiler, the Recorder says: "The patentees proceeded in their experiments on the principle that one fault of the Lancashire boiler was the tendency of its flues—which it shares in common with all flues that are not made on Mirfin and Nield's plan—to rely too much for their heating power on their upper surfaces. This is caused by the natural law that smoke and hot air must rise, and that therefore, if the flue be not full, the upper surface must be hotter than the lower.

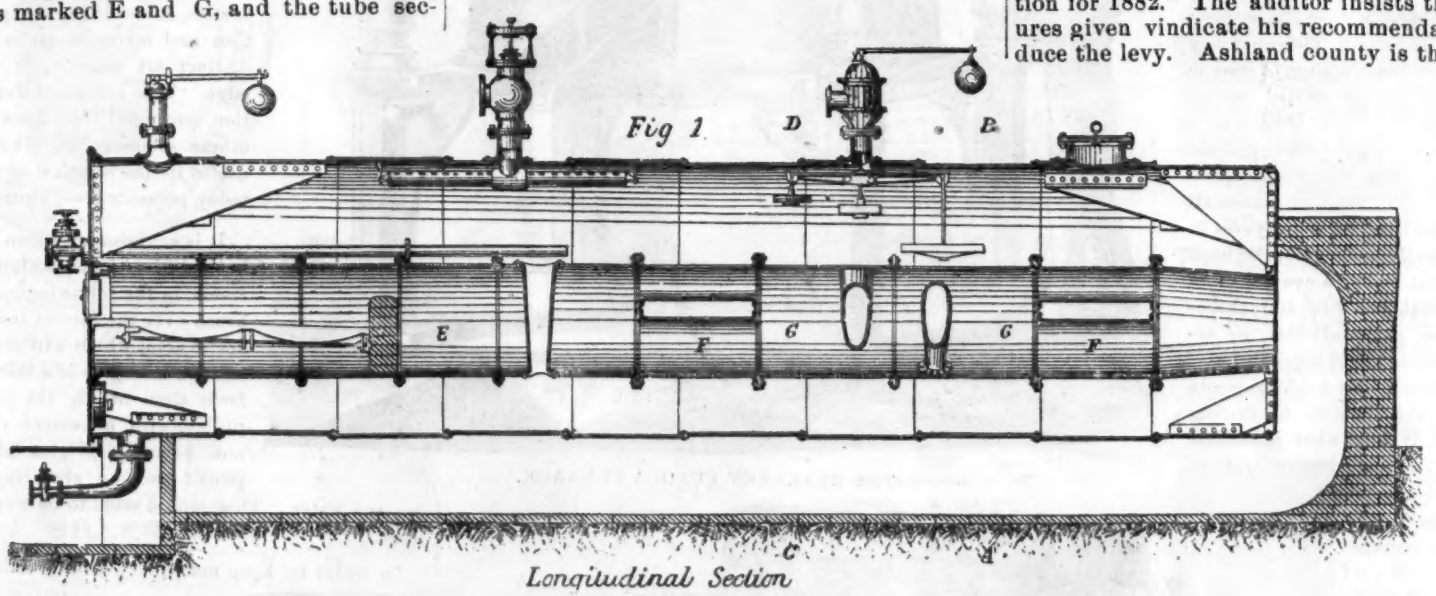
Fig. 3



Section on line AB

To distribute the products of combustion more uniformly over the circumference of the flue was the problem to be solved, and this had to be done without interfering in any way with the draught. The means adopted by the patentees to secure this end are indicated in the accompanying illustrations. It will be seen from Fig. 1 that this flue is not a continuous one. It is broken up into two chambers, called, respectively, the combustion chamber and the heat retaining chamber. Following the letters as they are shown on Fig. 1, A, B, C, D, E, F, G, an idea of the sections at the lines A B and C D will be obtained by reference to Figs. 3 and 2. At present we are concerned with the chambers marked E and G, and the tube sections marked F. The construction of these tube sections is shown more clearly in Fig. 3. There are four tubes, the three upper ones say of 10 inches diameter for the centre and 8 inches each for the sides, and the lower one of 20 inches. This lower tube is made of 20 inches diameter, so that a man can pass through into the various chambers of the boiler for cleaning purposes. Supposing the smoke and hot air to be coming over the furnace bridge, they first impinge against the water circulating pipe and against the tube plate of the section, and before they can pass out of the chamber E into the chamber G they must take their choice of the tubes. As the upper tubes are not of sufficient capacity, the greater portion are drawn through the lower tube, and before they can pass out of the heat-retaining chamber G into the chimney they pass through a second tube-section. Therefore the flue rings become heated all round, which not only increases the heating surface, but tends to equalize the expansion. It is also claimed that the patent tube sections add a considerable and very effective heating surface to the flues, and fully provide for their longitudinal expansion and contraction. Another advantage gained by the tube sections is proved by the small quantity of dust found in flues that are made on this principle. The draught being made to travel along the bottom of the flue carries the dust with it, the sum and substance of the advantages claimed for the Mirfin and Nield boiler being a saving of at least 20 per cent. in the consumption of coal by those firms who have laid them down."

Fig 1



Longitudinal Section

STEEL IN PLACE OF IRON.

Why It Cannot Usurp Iron in all Cases.

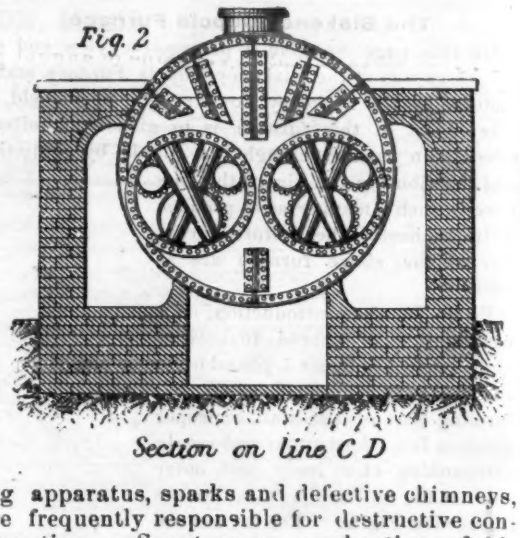
In an extended article on the Pittsburg iron trade, the Pittsburgh Telegaph says:

There have been quite a number of manufacturers in this city, who have filled steel orders in place of iron, but it seems that in every instance it has not proven satisfactory, for the reason that none of them make their own steel, but simply buy the steel ingots. In those mills at which steel is made from the first to the last stage, there the strong and light grades of carbon can be melted. In a number of places where steel can be used in place of iron a low carbon steel is the best. Iron is the same way; for different qualities different kinds of metal must be used. The iron from which boiler plates or tubes are made is not fit for nails, and old rails that are very suitable for railroad spikes are by no means fit for nails, or thin sheets. A reporter of The Telegraph spoke to a manufacturer of steel and iron as to the toughness of the steel, for instance, hoop. To which he replied: "We have a grade of steel here which can be rolled, and while hot placed in cold water, after which it may be bent into any shape without showing the slightest indication of cracks or breaks." It is only such manufacturers as have the facility for melting steel that make the largest rivals in the market in using steel in place of iron. Within the last year a great many steel and iron buyers and sellers, from the West, chiefly, but also from other places, have been in the city, going from one manufacturer to another, asking the lowest prices that iron and steel can be purchased at. An iron and steel manufacturer was spoken to on this subject. "Why don't these men stay at home and order what they want?" To which the gentleman replied, "That used to be the case; they would order their stuff, we would ship it, and in time get their check for their money. It is only a short time ago that one of our Western customers wrote to us to fill an order, which would amount to $8,000. He did not allow us to set our price, but told us what he would give us for our iron if we would fill the order. We would not make a cent, and if any of the machinery would break while the order was run out we would undoubtedly lose money. We know, however, that he will get his order filled. There is some one who will fill it, and knowing at the time that they are doing it at a loss, we have refused a number of such orders and will rather close our mill before we will make or sell iron at cost, or even at a loss." This is true of a great many iron men of this city.

Causes of Shop Fires.

Friction of machinery is one of the most common causes of fire, especially at night. The shaft heats from the center, and the heat may increase and spread after the machinery has stopped. Rats are the most common and dangerous incendiaries, by dragging greasy rags or waste into their nests, where the requisite heat and dampness are constantly present to create combustion, and they are sure to make nests in cold weather near steam pipes. Lighting apparatus, sparks and defective chimneys, are frequently responsible for destructive conflagrations. Spontaneous combustion of bituminous coal screenings is very common. Electricity generated by belts, steam pipes, steam heating apparatus, and steam feeds in saw mills, are causes of fires.

Fig. 2



Section on line C D

Ohio's Grand Duplicate.

Valuation returns from all counties of Ohio have been received by the auditor of state covering the periods of 1882 and 1883. The valuation on the grand duplicate for 1883 is $1,755,490,842, an increase of $38,631,148, over the valuation for 1882. The auditor insists that the figures given vindicate his recommendation to reduce the levy. Ashland county is the only one showing a decrease. The respective valuations of the two wealthiest counties are Hamilton, $208,632,202; increase, $3,165,126; Cuyahoga, $104,724,543; increase, $3,054,429. Paulding is shown to have the smallest valuation, being but $3,409,212; increase, $355,299. The report as a whole makes a most satisfactory showing of Ohio's wealth and growth.

When we go into an engine-room where the engine is manifestly badly out of order, it is well to suspend judgment until we know whether it is the fault of the employer or of the man in charge. Most engineers are keenly sensitive to criticism, and know when repairs are needed well enough, but their demands are often disregarded. It is not always the engineer's fault when an engine works badly.—[Mechanical Engineer.

Give the Western Machinist a trial.

CLEVELAND'S INDUSTRIAL POSITION IN 1883.

WHAT HER MANUFACTORIES HAVE BEEN DOING AND WHAT THEY PROPOSE TO DO.

Full Statistics of Iron and Kindred Interests Collected and Collated by the "Trade Review."

The year 1883 will be set down as one of peculiar trial to Cleveland's manufacturing interests. On the top of overproduction and closest competition has come the disturbing element of political uncertainty begetting want of confidence, and the result has been, in those branches most nearly allied to iron and steel production at least, a wise taking in of sails and enforced contentment with quite narrow margins. That in the face of these disadvantages the general manufacturing interests of Cleveland have shown a steady advance and fairly satisfactory results, is certainly a tribute to the wise as well as energetic management of our manufacturers, both large and small. A business census of the city's manufactures has not been attempted since the census year, so that our exact statistical position could not be known except by the merest guessing. To arrive at accurate and satisfactory figures in this regard, the TRADE REVIEW addressed letters of inquiry to from 150 to 200 manufacturing establishments more or less connected with the iron trade, making inquiries (1) as to the average number of hands employed during the year, (2) capital stock invested, (3) value of annual product, and (4) any improvements the past year and any contemplated improvements. The mail brought a fair return, and this has been followed up by as thorough a reportorial canvass of the city as has been possible, considering the difficulties in the way of such an undertaking; so that the figures given in the table accompanying this article may be relied on as substantially correct, though we do not vouch for the reliability of some of the returns given us. That even the present congested state of the iron market cannot retard the steady advance of our general manufacturing interests is shown by the list of new incorporations by Cleveland capital in 1883, published in our issue of December 22, the capital stock of these new companies aggregating $3,755,000 while existing establishments have increased their capital stock upwards of $1,000,000. According to the census of 1880 there were in Cleveland 1,055 manufacturing establishments, having an aggregate capital of $19,430,989, giving an employment to 21,724 hands to whom $8,502,925 were paid in wages, the value of material consumed being $31,629,737 and the aggregate value of products being $40,604,050. Basing an estimate upon the figures obtained by the TRADE REVIEW for 1883, we would have: Number of manufacturing establishments related to the iron business, 136; aggregate capital, $21,202,500; number of hands employed, 17,114; value of the year's product, $32,411,600. For details of the different branches of manufacture, we refer to the tables and reports below:

Iron Manufactures.	No. of Establishm'ts	Capital Invested.	Average No. Hands in 1883.	Value of Year's Product.
Iron and Steel	6	$8,225,000	7,750	$13,550,000
Machinery	30	1,271,300	1,198	1,158,600
Railway Equipment	10	1,655,000	1,295	4,067,000
Boilers	5	148,000	308	486,000
Steel Springs	2	125,000	90	275,000
Stoves, Furnaces, etc.	7	972,000	671	1,304,000
Vapor Stoves	6	113,000	104	432,000
Files, Tools, etc.	8	271,600	298	451,000
Nuts, Bolts, Rivets, etc.	5	520,000	660	1,030,000
Electric Apparatus	4	3,102,000	427	2,155,000
Brass Manufactures and Plumbers' Supplies	11	641,500	565	752,000
Ice Machines	2	100,000	100	290,000
Hardware Manufactures	7	910,000	890	1,481,000
Sewing Machines	3	1,900,000	1,100	2,220,000
Foundries	11	436,000	768	1,230,000
Miscellaneous Iron Manufactures	19	812,000	890	1,530,000
Total.	136	$21,202,500	17,114	$32,411,600

MACHINERY.

No city of like size possesses a greater variety of machinery manufactories than does Cleveland. Her high-speed automatic engines are known the world over. Her shafting and gearing are widely sought for on account of their excellent and scientific construction. Her astronomical work has been of such accurate construction that both the extreme East and the extreme West pay tribute to it with important orders. Her box making machines have a very wide sale. Her saw mill machinery is scattered pretty well over the entire continent. Her blowing engines, helve hammers, and marine work are second to none in the country. And her smaller machine shops stand exceedingly high for the superior work produced. Speaking for the engine trade, the year has been a very prosperous one, owing to the growing demand for high-speed automatic engines for manufacturing and electric lighting purposes. This demand is not confined to any one size but includes both large and small powers. The outlook for a good business in 1884 is quite encouraging. That the principal manufactory of gearing, pulleys, etc., is behind orders, augurs well for a large business next year. Some lines of the machinery trade report a partially dull year, but the general report seems to be that trade has perceptibly picked up during the past two months. The manufacture of steam pumps has been quite satisfactory—better in 1883 than in 1882 and prospects for 1884 are still better. As to the future, machinery manufacturers generally decline to venture an opinion in view of the uncertainty as to tariff legislation this Winter, yet not a few look for a revival after the holidays. Some manufacturers have doubled their capacity during 1883 and are well prepared to meet an increased demand when it comes.

SUMMARY.

No. of establishments	20
Capital invested	$1,271,300
No. of hands employed	1,198
Value of annual product	$1,158,600

IRON AND STEEL MANUFACTURE.

In common with manufacturers of iron and steel throughout the country, Cleveland's extensive concerns have felt the pinching effects of narrow margins and closest competition. Though most of the mills have been running with a fair degree of steadiness during the year, comparatively few large orders have been taken and manufacturers have been forced to content themselves with filling the hand-to-mouth orders that have come in. The extraordinary drop in steel rails, from $170 the net ton in 1867 to $35 in 1883, has taken nearly all the life out of the market, although several large concerns in the West are reported to be taking heavy orders at that low figure to keep their mills running during the Winter. The movement of raw materials has decreased, in sympathy with the generally depressed tone of the iron market, as will be seen by the article on iron ore, in another column, and the following table, specially prepared, showing the receipts and shipments of pig iron at Cleveland, by months, during 1883;

PIG IRON.

Month.	1882. Receipts.	1882. Shipments.	1883. Receipts.	1883. Shipments.
January.	3,910	25,614	6,692	2,582
February.	4,935	12,093	3,821	842
March,	5,367	1,100	4,457	1,435
April,	5,404	754	4,029	1,453
May,	8,684	1,946	7,206	2,329
June,	6,614	1,958	5,155	1,289
July,	7,678	1,932	4,884	4,763
August.	9,015	2,554	6,248	1,894
September,	7,098	1,555	7,579	1,947
October.	10,449	1,743	10,628	2,927
November,	6,541	1,828	10,380	5,916
December,	4,086	3,055	6,014	1,345
Total.	79,801	56,112	77,053	287,22

The production of pig iron has steadily decreased in the United States during the year, and with small stocks both at the furnaces and in the hands of consumers, it would seem as if the New Year must bring an early change for the better. Taken as a whole, Cleveland's various iron works have maintained a better position during the year than in many other localities, having run quite steadily until within the past few weeks though at greatly decreased profits. Tariff meddling, overproduction, Presidential politics and the uncertainty of next year's crops combine to render the future extremely uncertain; yet the situation might be far worse. The stoppage of rolling mills and nail factories, will, in the opinion of those in position to speak intelligently on the subject, so reduce the output that the opening of Spring trade will be in great contrast with the dullness that now prevails. Abundant facts are claimed to exist in support of this prediction.

SUMMARY.

No. of establishments	6
Capital stock	$8,225,000
Average No. of hands employed during the year	7,750
Value of annual product	$13,550,000

RECEIPTS AND SHIPMENTS.

The following tables exhibit the receipts and shipments at Cleveland of various iron products during 1883 and 1882 respectively:

BARS, HOOP, SHEET, ETC., net tons.

Month.	1882. Receipts	1882. Shipm'ts	1883. Receipts	1883. Shipm'ts
January,	6,694	4,574	5,160	3,835
February,	6,991	3,959	5,375	3,725
March,	7,811	4,929	6,294	4,332
April,	8,004	3,930	5,815	3,521
May,	7,111	6,641	7,498	7,767
June,	3,045	5,577	5,547	5,930
July,	2,329	4,236	5,006	5,271
August,	8,942	5,173	4,365	4,315
September,	3,256½	5,523	4,411	4,212
October,	4,664	7,031	5,013	8,205
November,	5,637	6,097	4,710	4,324
December,	3,745	4,228	2,922	5,470
Total.	68,229½	61,898	62,116	60,887

BLOOMS, BILLETS, &C., net tons.

Month.	1882. Receipts	1882. Shipm'ts	1883. Receipts	1883. Shipm'ts
January,	3,013	128	1,022	199
February,	3,932	264	943	0
March,	4,329	209	625	45
April,	5,418	855	822	64
May,	3,244	746	1,325	0
June,	1,680	564	1,113	26
July,	4,193	49	472	0
August,	7,333	174	679	0
September,	6,438	509	765	11
October,	4,364	1,710	1,236	0
November,	3,553	1,500	1,436	110
December,	1,724	745	803	398
Total.	49,221	7,453	11,241	853

MISCELLANEOUS.

	1882. Receipts	1882. Shipm'ts	1883. Receipts	1883. Shipm'ts
Muck Bar	2,556	336	3,175	461
Scrap	49,201	41,739	50,073	12,530
Spiegel	4,564	61	8,217	849
Splices, Links, &c.	837	9,842	8,378	9,588
Car Axles	839	9,453	352	4,014
Nails, kegs	128,111	132,464	138,235	211,377
Rails, iron	13,800	43,825	6,812	25,405
Rails, steel	6,479	23,984	3,474	35,575
Wire	19,768	21,039	5,652	14,277

RAILWAY EQUIPMENT.

Cleveland's manufactures in this line include

Continued on Page 6.

THE TRADE REVIEW AND WESTERN MACHINIST.

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To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contribution will be properly revised before sending to press.

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POSSIBILITIES OF ROPE TRANSMISSION.

Describing recently a new device in this city for making use of rope in the transmission of power, we remarked that though the application was a novelty, the principle was old. The year 1850 is usually named by text books and encyclopedias as the date on which this form of power-transmission was first put to practical use, but a recent discovery, in the archives of the city of Dantzic, Germany, sets the date back over 200 years. A description, accompanied by drawings, was found, bearing the name of Adam Wybe, a Dutch engineer, showing an arrangement designed by him in 1644 for carrying, by rope tramways, the earth excavated on one side of the city fortification ditch across to the other side. The value of rope tramways of this kind for transporting coal, ore, stone, etc., particularly over very difficult ground that would involve complex road construction, was early appreciated, while its benefits have since been much more widely applied by the introduction of wire rope. As a substitute for common belting in carrying power from one department to another in large manufactories, however, common hemp rope again rises into importance and is coming into rapid and general favor.

In England, the substitution of hemp rope for belting has become quite common. In a new cotton mill at Halifax, for instance, the main wheel or driving pulley on the second motion shaft from the engine is grooved, and the power is conveyed to grooved driven pulleys by 20 ropes. The main wheel is 12 feet in diameter and runs 104 revolutions per minute, while the driven wheels are 7 feet in diameter and turn 180 revolutions per minute. Two-inch rope is generally used, running 4,320 feet per minute. The greater the velocity of the rope the greater the efficiency, up to 5,000 feet per minute. With a rope 2¼ inches diameter and pulleys above 6 feet, each rope, it is said, will drive 10 indicated horse-power every 1,000 feet of rope speed per minute. In respect to economy, it is figured that the first cost of ropes is £175 ($875); first cost of leather belts, £1,700 ($8,500); weight saved, one-third at least power saved, represented by one-third of the belts at 4,320 per minute. While the wear is greater than that of belting, it is claimed that the ropes wear out one at a time, and can be replaced during meal time without loss of time.

Concerning some interesting and exhaustive experiments in this country, we are promised valuable and original data in the near future.

A MECHANICAL TEST OF COKE.

The fact that a great deal of bad coke finds its way into the market has called for some kind of mechanical test whereby its real value for iron-smelting can be arrived at practically and accurately. Of course chemical tests can be made, but these are not always attainable or satisfactory in practice. To meet this want, a Cleveland furnace manager has been experimenting with a mechanical testing machine of his own device, upon half-inch cubes filed out of different varieties of coke, with very interesting results. We cannot yet present these results in figures, but enough has been accomplished to demonstrate that the furnace value of the coke is in direct proportion to its ability to resist pressure. In other words, the longer it has been burned, up to a certain limit, the better it will resist mechanical pressure, and the greater its value for smelting purposes. The device used is in form an ordinary testing machine, with lever combination. Cubes of the size stated (half an inch face) were found to be of the best size for testing. The results of these experiments will be awaited with interest by iron workers generally.

A TYPICAL WORKSHOP.

To penetrate its dismal precincts, the visitor was compelled to climb a rickety stairway, in momentary danger of putting a foot through a broken board or knocking his hat over his eyes by violent contact with a projecting beam. The door once gained, a search in the dark was necessary before the *place* for the latch, was found—there proved to be no latch, however—and then a struggle ensued before the broken and rusty hinges would swing open and allow the discouraged investigator to enter. "Was the proprietor in?" "Yes," came the answer from a workman who looked as if a breath of fresh air and a liberal supply of God's sunlight would make a new man of him, "Over there in the corner hunting for patterns."

Castings, pulleys, machinery in all stages of manufacture blocked the way between the inquirer and the inquired of. The ceiling was low and cobwebby. A stifling mixture of must, smoke and dirt pervaded the room. Four small windows, or excuses for windows, reminded the visitor that once, in the past as dim as they were now, their purpose was to admit light into the apartment. The floor, which inclined in several directions, reminded one of the deck of of an Atlantic steamship during a storm—except that, unlike the latter, it was never swept. The few men at work seemed to have acquired a stooping posture and a strained look of the eyes in their efforts to search in the dark for missing tools.

At last, amid much tribulation and not a little knocking of the shins, the proprietor was reached. Still he searched among the patterns. That one thing seemed to be upon his mind. He was unfitted for ordinary business by reason of the worry which this useless search forced upon him. He was like his shop—systemless, confused and generally down at the heel. What else could be expected? Counting the time lost by the proprietor in the fruitless search after the lost pattern and of his men in their gropings in the dark to get at their work, not to speak of the depressing effect of such gloomy surroundings and slipshod methods, what becomes of the margin of profit? This is no fancy sketch. Unhappily, it is too easily duplicated.

ENGINEERS AND ENGINEERING.

Verily the engineering profession is, in these modern days, made to answer for a great many sins not its own. Recently we called attention to the rapid multiplication of engineering specialties, such as saw mill engineering, milling engineering, tramway engineering, canal engineering, sanitary engineering, park engineering and the like. To these have lately been added agricultural and irrigation engineering, the not less striking designation of laundry engineering, adopted by a Manchester (Eng.) firm, and, last but not least, the most mysterious title of "Traveling Engineer" applied to a gentleman connected with a Western railroad—though what that means nobody has yet been able to find out.

No doubt this illustrates the growing dependence of the general public upon the engineering profession, *apropos* of which we were told the other day by the Assistant City Civil Engineer of a large city that the calls upon his office were most varied, not to say original. Recently, in a single day, he was appealed to by telephone to settle a question in gunnery, and soon after received a call from a Michigan man who had invented a petroleum burner upon the merits of which he wished a candid (and gratuitous) opinion. What with the piling up of councilmanic resolutions for estimates upon impossible bridges, and the multitudinous details covered by the almost limitless field wherein engineering skill may play a most important part, the life of the average engineer of today is apt to be pretty much of a burden.

A "NEW" Buffalo smoke "consumer" is thus described: "The neatest device for a smoke consumer is the building of a low bridge wall about half the distance back in the fire chamber over which the smoke passes and is met by a current of air, oxygen, coming through an opening back of the bridge wall, causing complete combustion of all the smoke in the back part of the chamber and being directly under the boiler." If the inventor wants to see such a device in actual operation, he should come to Cleveland; perhaps the one we have in mind, which has been in use some five or six years, may give him some new ideas.

IT was an apt designation of the perpetual motion insanity by Prof. Coleman Sellers, Sr., in a recent address to mechanics, in Philadelphia, when he said that "there are many cranks besides the crank that turns the grindstone, but the worst crank is the crank who is going to improve on the crank."

EVENING classes in mechanical drawing have been established under the auspices of the Cleveland Young Men's Christian Association. A good move.

BOILER EXPLOSIONS AND GEARING.

The December meeting of the Civil Engineers' Club of Cleveland, though without the usual paper, was full of interest by reason of the discussion of two previous papers, that of Mr. A. C. Getchell on "Causes of Boiler explosions" and that of Mr. John Walker on "Gearing." After Mr. Getchell had repeated the substance of his paper (which has already appeared in these columns),

Mr. J. F. Holloway, President of the Club, said that it seemed to be evident that boilers blew up very often

indeed just when the engine is starting up. The well-known theory of the storage of heat while boilers are at rest might explain this, the excess of heat causing over-pressure in the boiler, so that release by the throttle lets it expand and gives it more pressure than if the steam had been in regular use. On Ohio and Mississippi river steamboats this was regularly provided for. Whenever a boat is approaching a wharf, the engineer opens what he calls a "bleeder," to blow off the extra steam. The question of grease, the speaker continued, was a little misleading, because in talking about grease we don't mean all kinds, simply the animal oils and fats used in lubricating the engine. The use of mineral oils was not considered dangerous, but beneficial.

Mr. E. H. Martin, Chief Engineer of the Cleveland Rolling Mill Co., said that his experience extended over a good many years, both in this country and in England, and as three general causes of boiler explosions he would name collection of foreign matter on the plates, the stopping of circulation, causing latent heat, and the superheating of steam under water. The speaker illustrated the latter by reference to some interesting experiments witnessed by him in London. A rule laid down for naval engineers is that whenever a ship is not under steam they are to constantly lift the safety valves so as to keep up circulation. If they see water coming from the safety valves or upper outlets, under no circumstances to start the engines. The fulminant explosions are the most mysterious; nearly all of them occur at the opening of the throttle.

Mr. Getchell said, referring to the experiments witnessed by the speaker, that he had found by tests that in tubes filled with water he could get an explosion when held in an upright position over the flame, but never when held horizontally. If the tube be hermetically sealed with a drop of oil in the top, an explosion will follow ebullition.

Mr. Martin—I believe there is more destruction from grease entering boilers through open heaters, than from any other causes.

Mr. Getchell—I used to be down on the open heaters, but I have found that in some cases we can't get along without an open heater. A closed heater accumulates magnesia. I never accept an open heater, when animal oils are used. I have analyzed oil in which I found 46 per cent. of tallow.

In answer to questions, Mr. Getchell said that boilers made of sheets of unequal thickness were more apt to explode. Another fault was getting too thick sheets. In illustration of his theory of expansion and contraction, Mr. Getchell stated that he had just returned from Cincinnati where he saw boilers the heads of which were being pushed out by the tubes, by reason of the corrugating of the sheets. The engineer, he added, had been using tallow oil.

N. B. Wood had a theory, he said, that the animal oils were composed mainly of certain acids, which, under pressure, decomposed and with carbonate of lime formed a kind of soap, a great non-conductor, which, settling on the bottom of the boiler, repelled anything short of a red heat.

President Holloway called attention to a recent device for illuminating the interior of boilers by means of electric lights and expressed the hope that by this means the phenomena of steam generation could be actively observed.

In the discussion of the subject of "Gearing," of which our limited space will, much to ou regret, allow only a brief *resume*, Mr. Martin, in answer to inquiries by Mr. Wood, stated that instead of sliding, as supposed, gears properly constructed always rolled—a fact which he had repeatedly seen demonstrated in his own works by pasting with shellac tissue paper upon the gear teeth, and although working for hours, the paper remained in place. We have, he said, wheels six years old, working 200 horse power, 15-inch face, with no perceptible wear. If they did not roll they would not last.

Mr. Swasey, in some very interesting and practical remarks, took issue somewhat with Mr. Martin in regard to the rolling of gear teeth, holdingth at there were rolling and sliding at the same time. We hope to give Mr. Swasey's remarks in full in a future issue.

DR. WEDDING says that when melted cast-iron is allowed to chill, the first crystals which form are nearly pure iron. He suggests that, by repeatedly crystallizing the iron, a metal of high character may be obtained from poor pig-iron. This would work very well but for one thing, which is that poor iron will not chill.—[Mechanical Engineer.

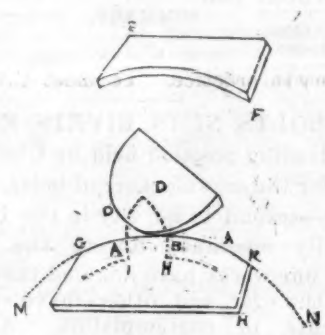
Hints from Practical Men.

To Make the Pattern of an Epicycloidal Tooth.

Miller's Review.

Having determined the pitch of the teeth, and the radius of the pitch circle, strike an arc of the pitch circle on a thin piece of oak board or metal plate, and, with a fine saw, cut the board through along the circumference of this circle, so as to divide it into two parts, one having a convex and the other a corresponding concave circular edge. Let EF represent one of these portions of the board, and GH another.

Describe an arc of the pitch circle upon a second board or plate from which the pattern is to be cut. Let MN represent this arc. Fix



the piece GH upon this board, so that its circular edge may accurately coincide with the circumference of the arc MN. Take, then, a circular plate D of wood or metal, of the dimensions which it is proposed to give to the generating circle of the epicycloid; and let a small point of steel P be fixed in it, so that this point may project slightly from its inferior surface, and accurately coincide with its circumference. Having set off the width AB of the tooth, so that twice this width increased by from $\frac{1}{10}$th to $\frac{1}{15}$th of that width (according to the accuracy of workmanship to be attained) may equal the pitch, cause the circle D to roll upon the convex edge GK of the board GH, pressing it, at the same time, slightly upon the surface of the board on which the arc MN is described, and from which the pattern is to be cut, having caused the steel point in its circumference first of all to coincide with the point A; an epicycloidal arc AP will thus be described by the point P upon the surface MN. Describe, similarly, an epicycloidal arc BE through the point B, and let them meet in E.

Let the board GH now be removed, and let EF be applied and fixed, so that its concave edge may accurately coincide with the circular arc MN. With the same circular plate D pressed upon the concave edge of EF, and made to roll upon it, cause the point in its circumference to describe in like manner, upon the surface of the board from which the pattern is to be cut, a hypocycloidal arc BH passing through the point B, and another AI passing through the point A. HEI will then represent the form of a tooth, which will work correctly with the teeth similarly cut upon any other wheel; provided that the pitch of the teeth so cut upon the other wheel be equal to the pitch of the teeth upon this, and provided that the same generating circle D be used to strike the curves upon the two wheels.

Reading a Diagram.

"Wrist Pin" in American Miller.

The cut shows a diagram taken with a Crosby indicator, 50-pound spring, from a 16x36 in. "Greene" engine; boiler pressure 100 gauge pounds=114.7 lbs. absolute, speed 80 turns per minute. The initial pressure (A B to D) is 93 gauge pounds=107.7 lbs absolute, showing throttling; steam line D E sloping downward, showing wire-drawing; cut-off lazy. The clearance being 2.47 per cent., the actual expansion rate, counting from the point E, where the curve changes, and where the pressure is 80 gauge pounds (94.7 lbs. absolute) is 3.22, which ought to give an absolute terminal pressure of 64.7÷3.22=29 35 lbs; but if we carry out the expansion curve from F until it strikes the vertical at the end of the diagram, we find an actual terminal of 38.7 lbs. absolute. This would indicate that there was a leak in the cut-off, or in the piston or re-evaporating, the latter hardly probable.

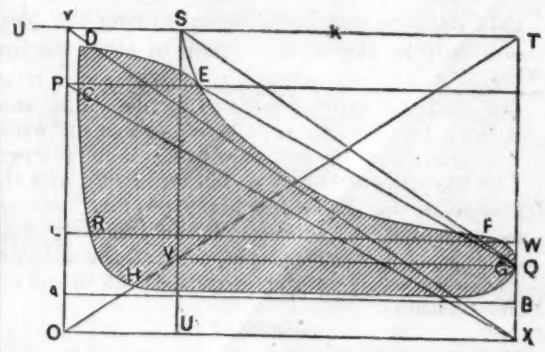
We will test this in another way. Carrying the curve E F up to the full boiler pressure line J K, we find the actual expansion rate at that pressure to be 1.0247÷(2284+.0247)=4.009+; and 114.7÷4.009+=29.4+, which is almost what the absolute terminal pressure should be.

There is a simpler way than this of finding graphically at what height the expansion curve should terminate. Through E, point of cut-off, draw a horizontal line parallel to the atmospheric line, and suppose it to cut the vertical clearance line at a point P. Draw a diagonal from P to X, and through E draw a diagonal parallel to P X. This will cut the vertical from X at some point Q, which as it falls considerably below where E, F would strike the same vertical, shows that the terminal pressure is too high.

This may be again proved by drawing a diagonal from the corner Y to X, and a parallel to it from the point S, where the expansion curve continued would strike the boiler pressure line J K. This strikes the terminal vertical X T at the same point Q.

A still further proof is by drawing a diagonal from O to T, and a vertical s v from S to O X, and then from the point V, where the vertical cuts the diagonal, draw a parallel to the atmospheric line. This also will cut X T at Q.

But to continue: The exhaust opens slowly, although, it starts early; so that the piston has



made a considerable portion of its return stroke before the back pressure reaches the minimum of two pounds. Cushion commences at .821 stroke; and if the valve closing was instantaneous, it would compress the exhaust steam from 20.37 to 2.47 piston displacement, which ought to raise the counter pressure from 2 gauge pounds=16.7 lbs. absolute to 137.7 lbs. absolute=123 gauge pounds, which would be above boiler pressure. But the exhaust closes but slowly, and the cushion does not exceed initial pressure, 93 gauge pounds. The mean effective pressure (by ten ordinates) is 50.25 lbs., which we shall roughly assume as 50. to consider the theoretical consumption of dry steam per hour per horse power. Calling the absolute terminal pressure 39 pounds, we should have a theoretical dry steam consumption of .0952×32 32÷.1175=26.1 lbs per hour per horse power, making no allowance for cushion.

Drawing from the terminal point a line W L parallel to the atmospheric line and meeting the clearance line T O, we find that the cushion curve cuts it into two parts, W R, R L, the longer of which, inside the closed tracing, is .942 the whole line; and multiplying by .942, we get as the theoretical dry steam consumptionper hour per horse power, allowing for compression about 24.59 pounds.

Polishing Steel.

The finer the polish which is imparted to the surface in case-hardening the better will be the results. The art is a very useful one and should be thoroughly understood by every smith and worker in metal. The process is very simple. The articles are placed in some air-tight receptacle, generally an iron box, but often a pipe, which can be turned, and therefore admits of the more uniform application of heat. The receptacle is filled with coarse charcoal powder and exposed to a cherry-red heat for twenty-four hours; if a hard surface one-eighth of an inch is desired, but from four to five will be long enough to make a good surface of steel.—[Sewing Machine News.

CLEVELAND'S INDUSTRIAL POSITION IN 1883.

Continued from Page 3.

one of the largest steel rail mills in the United States, the next largest steam forge works in the world, and extensive establishments for turning out locomotives, railroad frogs, cars, iron bridges, machine tools, etc. The restriction in railroad building during 1883 has more or less seriously affected this industry. According to the Railway Age of the present week, 6,000 miles of main track were laid during the year, at an approximate cost of $165,000,000, against 11,600 miles laid in 1882 and 9,800 miles in 1881. As a consequence, the buying of railroad equipment has also decreased, and the year's business does not show up as largely as it otherwise would. Still a fair degree of prosperity has been enjoyed in some lines, bridge-building being especially active. The car wheel works started here during 1883 report a rather dull year but find prospects better, a sharp demand for cars having sprung up within the past 30 days. Leaving out of account the steel rail business, which is included under the head of "Iron and Steel," we have the following:

SUMMARY.

No of establishments	10
Capital invested	$1,655,000
No. of hands employed	1,295
Value of annual product	$4,067,000

BOILER MAKING.

Steady advance in this important line of manufacture has been made during the year, not only in the substitution of steel for iron plates, but in the introduction of machine riveting and the improvement of forms. The steel boilers turned out in Cleveland are in every way creditable to her manufacturing renown. The business of the year foots up well, and the prospects for 1884 are good so far. Several large concerns combine boiler making with other lines of manufacture, so that the subjoined summary is only approximate as to the entire business.

SUMMARY.

No. of establishments	5
Capital invested	$148,000
No. of hands employed	308
Value of annual products	$486,000

STEEL SPRINGS.

This is an important and growing industry, concerning which we regret that we have had to estimate a part of the figures given below. The volume of business has been good in this line the past year, but prices have been low, and the last three months the market has been flat. As to the prospects for the future, both the product on hand and jobbers' stocks are low, which would raise the presumption that a fair business during 1884 may be looked for; but that is as yet an enigma.

SUMMARY.

No. of establishments	2
Capital stock	$125,000
No of hands employed	90
Value of annual product	$275,000

STOVES, FURNACES, ETC.

Not only in iron heating and cook stoves, but in heating furnaces and vapor stoves, Cleveland does a very large business. In the manufacture of vapor stoves she is far in advance of any city in the Union, controlling 95 per cent. of the production. Stove manufacturers are, also, extensively engaged in the vapor stove business in connection with their regular trade. The constantly changing fashions in heating stoves has been met with a corresponding degree of energy on the part of Cleveland manufacturers in turning out stoves of the most approved type. While the business of the past year has not, as a whole, been equal to that of 1882, the aggregate is in every way creditable to our city. Probably owing to overproduction, trade will be a little slow at the beginning of the new year, but a fair trade is expected in the aggregate.

SUMMARY (GENERAL STOVE MANUFACTURE).

No. of establishments	7
No. of hands employed	671
Capital invested	$979,000
Value of annual products	$1,304,000

VAPOR STOVES.

No. of establishments	6
No. of hands employed	104
Capital invested	$113,000
Value of annual product	$432,000

TOOLS, FILES, TWIST DRILLS, ETC.

Capital is rapidly going into this line of manufacture, which is assuming large proportion in this city. One file works increased its capacity 25 per cent. during the year, and others have added to their facilities in various ways. One tool company has been re-capitalized and its capacity quadrupled during the year. A twist drill company reports a very good year as a whole, but slack during the Fall, at a time when business should have been better. Prospects for the coming year are as yet problematical in view of the uncertainty of "Presidential year."

SUMMARY.

No. of establishments	8
Capital invested	$271,600
No. of hands employed	298
Value of annual product	$451,000

BOLTS, NUTS, RIVETS, ETC.

The leading position held by Clevleand as a center for the manufacture of bolts, rivets and washers—second to no city in the Union—has been fully sustained during the past year. Some of our works have donbled their capacity during the year, and others have various improvements in contemplation. A very fair volume of business has been done, but the outlook is scarcely flattering, though manufacturers feel that consumers must buy soon to supply the natural wants of trade. The material used is bar, plate, rod and wire, all of which are turned out here. Sales are not confined to the West, the carriage, machine and stove bolts, rods, rivets and pins being in good demand in the East. The machinery employed is the best of the kind in the world and has been greatly improved in several important respects during the year.

SUMMARY.

No. of establishments	5
Average number of hands employed,	660
Capital invested	$520,000
Value of annual product	$1,030,000

BRASS MANUFACTURE.

Cleveland's position as an entreport for Lake Superior copper, and the excellence of her location with reference to cheap fuel and convenience of shipping, render her an important point for the manufacture of brass goods, in which are included plumbers' stock, gas and steam fittings, and engine and boiler trimmings and fixtures. The figures below cover the extensive brass works at Lorain, O., essntially a Cleveland concern. Most manufacturers have enjoyed a good year, with fair prospects for 1884.

SUMMARY.

No. of establishments	11
Capital invested	$641,500
No. of handsem ployed	565
Value of annual products	$752,000

ICE MACHINES.

From only three establishments for the manufacture of ice machines in existence when the Arctic Ice Machine Co., of this city, began operations, the number has increased to over 50, of which two extensive ones are located in this city. Trade has been fair the past year and is steadily increasing, with good prospects for 1884. Besides the tardiness of the Winter, which has caused an increased demand for these machines, brewers are generally substituting ice machines for packing in ice.

SUMMARY.

No. of establishments	2
No. of hands employed	100
Capital invested	$100.000
Value of annual product	$230,000

HARDWARE MANUFACTURES.

In keeping with the large volume of business done by Cleveland hardware jobbing houses—amounting to between $5,000,000 and $6,000,000 per annum—there has sprung up in this city a large interest devoted to the manufacture of various hardware specialties. These concerns have generally experienced a favorable year and report the outlook for 1884 fair, though they do not look for any "boom." As will be seen by the following aggregate, this branch of business has already reached notable proportions.

SUMMARY.

No. of establishments	7
No, of hands employed	800
Capital invested	$910,000
Value of annual product	$1,481,000

SEWING MACHINES.

Cleveland has become a great center for the manufacture of sewing machines, as will be seen by the subjoined statistics. Manufacturers report that trade has been retarded somewhat the past year by reason of the rainy Spring, the cool Summer and the early frost, making bad crops; yet the aggregate production for the year has been very large. As to the coming year, they say there is no foundation for great expectations, as people will no doubt be more conservative in buying.

SUMMARY.

No. of manufactories	3
No. of hands employed	1,100
Capital invested	$1,900,000
Value of annual product	2,220,000

FOUNDRY BUSINESS.

The foundry business is so intimately connected with other lines of iron manufacture that it is difficult to separate it for individual statistics, but the subjoined summary is approximately correct. Business during the year has been fairly up to the average, though margins have been close. The prospects for closer margins yet are altogether too flattering. Said the member of one prominent firm: "The unsettled condition of all things pertaining to the iron market, in addition to the fact of a Presidential election in the near future, gives the future a shade darker color." The pipe business has been good in view of large city contracts let during the year.

SUMMARY.

No. of foundries	11
Capital invested	$436,000
No. hands employed	708
Value of annual product	$1,230,000

MISCELLANEOUS IRON MANUFACTURES.

Cleveland has shown considerable advancement in the building of marine engines in the past, and builders report trade especially active during 1883 in changing engines from single to compound. The manufacture of round-wire nails has grown to considerable importance in this city, the business of the past year having been fairly good, though the outlook is uncertain. The business of wire products has been much depressed on account of overproduction, yet the capacity of Cleveland works has been steadily increased. The iron roofing business has been fairly prosperous, but margins have been close. Manufacturers look for a quiet year. Printing presses are now manufactured extensively here, large sales having been made the past year. The electric light business and its accessories amounts to upward of $2,150,000 per year. Besides these, may be mentioned barbed wire fencing, steel screws, shovels, etc., and a host of smaller but no less important manufactures.

NOTES.

The Forest City File Co. expect soon to go out of business.

The Viaduct Foundry has doubled its capacity during the past year.

Additional machinery has been put in by the Powell Tool Co. during the past year.

Warner & Swasey expect the coming year to make quite a number of additions.

Lord, Bowler & Co. have increased their capacity about 20 per cent. the past year.

The capacity of J. Noyes Smith's nut and bolt works has been doubled during the year.

The Brown Manufacturing Co. increased their business the past year about 15 per cent.

The capacity of Myers, Osborne & Co.'s stove works is about 10 per cent. larger than a year ago.

About 20 per cent. has been added to the capacity of the Cleveland Wire Works during 1883.

During the past twelve months the Buckeye Bridge and Iron Works have put in three rivet-

ing machines, increasing their capacity one-fourth.

The capacity of the White Sewing Machine Co.'s works has been increased about 15 per cent. during the year.

By additions made during the year the Garry Iron Roofing Co. have increased their capacity one third.

Abont 25 per cent. has been added to the capacity of the Parkin File Co.'s works during the past year.

Palmers & DeMooy, iron founders, have enlarged their capacity by half since the beginning of the year.

The past year has witnessed the doubling of the capacity of Peter Gerlach & Co.'s saw mill machinery works.

The moulding room of the Cleveland Stove Co. has been increased to the extent of giving employment to 20 more men.

A 60x80 foot addition and some new machinery are the improvements put in by the King Iron Bridge & Manufacturing Co.

Joseph Chatterton, boiler maker, 30 West Center street, has increased the capacity of his works about one-third during 1883.

James Aitchison, Canal street, contemplates doubling the capacity of his machine shop if trade keeps up as well with him as at present.

Four new buildings have been added to the Cummer Engine Co.'s works during the year, at a cost of $7,500. Two additional wings are in contemplation for 1884.

From November 1, 1882, to November 1, 1883, Bowler & Co. purchased 6,614 tons of pig iron, old car wheels and cast scrap. During the year they paid their men $50,735 in wages.

Michael L. O'Rourke, saw manufacturer, 65 South Water street, contemplates putting in a furnace and two machines, with which facilities he will be able to make 24 saws where he makes one now.

The Hotchkiss & Upson Co. have made additions to their nut and bolt works during the past year, and are contemplating some for the coming year but do not care to speak of them at present.

The improvements put in by John S. Oram, machinist, 155 and 157 River street, the past year, consist of one 50-inch pulley lathe, one 20 foot shafting lathe, one 26-inch pulley lathe and one key-seating machine.

The year has been one of steady progress with the Standard Rivet Co. Besides adding extensively to their machinery, they have begun the manufacture of track bolts, steel tapered rivets for boat-building, etc.

Since adding to their business the manufacture of drop forgings, the Cleveland Machine Co. have worked it up until it now amounts to nearly as much as their box and packing machinery does, and bids fair to exceed it.

The major part of the year has been devoted by the Leader Sewing Machine Co. to making tools and fixtures and increasing facilities for future production. They are now completing in this city one of the finest sewing machine factories in the West.

Additions to their works have been made by the Cleveland Co-operative Stove Co. during 1883 as follows: One building 66x66, 3½ stories, for mounting and storage; one 180x65, one story, for moulding room, and one 50x50, 1½ story, for pattern room—all brick, stone and slate.

COAL.

Cleveland's coal position in 1883 was reviewed in this journal at the close of navigation, a summary showing a shrinkage of receipts over 1882 of about 100,000 tons, while shipments exhibited an increase of about 60,000 tons over the previous year. Fuller reports of receipts and shipments of both anthracite and bituminous coal are shown in the following tables, in which comparisons are instituted by months between the two years.

The total receipts and shipments of coke for the years stated have been as follows: Receipts,

[Concluded on Page 8.]

THE IRON ORE CONSUMPTION OF 1883.

THE SURPLUS ON DOCK AT ALL LAKE ERIE PORTS.

About 15 per cent. Less Carried Over than Last Year.

At the expense of much telegraphing, as well as personal visits to some of the cities mentioned, the TRADE REVIEW is enabled to lay before its readers the full statistics of iron ore receipts at each Lake Erie port for the season of 1883, as well as the amount of ore on dock at the close of navigation in 1882 and 1883 respectively. The interesting facts obtained are to be found in the following table:

Port.	Total Receipts of Iron Ore, 1883. (tons)	Amount on Dock, Dec 1, 1883. (tons)	Amount on Dock, Dec 1, 1882. (tons)
Cleveland	723,129	428,654	511,245
Buffalo	40,203	17,500	10,500
Erie	106,787	95,369	105,898
Ashtabula	670,000	291,878	294,990
Fairport	40,334	15,000	18,343
Sandusky	58,825	28,000	37,000
Lorain	25,794	25,611	50,000
Toledo	27,617	*25,000	*35,000
Total,	1,692,689	927,012	1,062,976

* Estimated.

As will be seen, the total receipts at all Lake Erie ports during 1883 were 1,692,989 tons. The total amount on dock at the close of the navigation was 927,012 tons, as against 1,062,976 tons on dock at the same ports at the close of navigation in 1882, a decrease of 135,964 tons, or about 15 per cent. Should consumption be resumed at even an ordinary rate, it would appear as if this surplus it would pretty well cleared up by the opening of navigation in 1884.

AT CLEVELAND.

The following table (specially prepared for the TRADE REVIEW) exhibits by months, receipts and shipments of iron ore at Cleveland during 1882 and 1883 respectively, (the last week in December omitted):

	RECEIPTS.			SHIPMENTS.		
Months.	1883. Tons.	1882. Tons.	Months.	1883. Tons.	1882. Tons.
January,	121	124	January,	61,028	71,152
February,	73	133	February,	43,350	66,563
March,	11	296	March,	53,992	96,454
April,		19,942	April,	56,259	79,254
May	44,249	179,930	May,	52,768	46,578
June,	94,220	227,363	June,	55,682	49,463
July,	136,348	177,190	July,	65,282	42,697
August,	137,098	137,103	August,	77,611	40,525
September,	104,664	137,728	Sept.,	66,406	47,632
October,	105,068	135,547	October,	77,614	55,889
November,	85,096	127,801	Nov.,	70,500	60,481
December,	16,192	12,060	December	55,306	65,153
Total.	723,140	1,155217	Total.	735,798	721,941

As shown in a previous issue, the total receipts were 33 per cent. less than last year, and the amount on dock is 16 per cent. less.

In reality, the receipts at Ashtabula, Fairport and Lorain, being in the same district, should go into Cleveland's aggregate, in which event our total for 1883 would be 1,459,257 tons. The largeness of Ashtabula's receipts will be a surprise to many. Cleveland, however, remains the great port of entry for the trans shipment and consumption of the ores of the Lake Superior regions, as she will no doubt be an important point for the receipt of the newly developed Vermillion ore mines of Minnesota and those of Hastings County, Ontario, in both of which Cleveland capital is largely interested. Following have been the total receipts of iron ore at Cleveland and Ashtabula for the years named:

	Cleveland.	Ashtabula.
1883	723,129	670,000
1882	993,048	598,037
1881	826,419	377,976
1880	758,983	298,594
1879	525,402	222,030
1878	509,332	195,254
1877	505,974	218,145
1876	111,268	177,648
1875	245,801	115,660
1874	456,692	79,216
1873	674,324	15,112
1872	622,059	.....
1871	395,721	.....
1870	581,461	.....

The average lake freights to Lake Erie ports during theyear have been $1.30 from Marquette and $1.10 from Escanaba. The established price of Republic Bessemer ores has been $7.00.

AT CHICAGO.

The total receipts of iron ore at Chicago during the season of 1883 were 64,689 tons, against 235,161 tons for 1882, a decrease of 170,472 tons, or 72.5 per cent. The disparity in the aggregate receipts of the two years is owing to the omission of South Chicago harbor from the Chicago district this year. But allowing for this, the decrease is very marked.

AT ERIE.

The receipts of iron ore at Erie were 107,000 tons, of which 37,000 were shipped south over the Erie & Pittsburgh and the remainder was left on the docks awaiting shipment.

AT TOLEDO.

Toledo's receipts of iron ore aggregated 27,617 tons, of which 18,463 tons came from Marquette, 4,969 from Escanaba, 3,235 from Duluth and 950 from St. Ignace.

THE LAKE SUPERIOR OUTPUT FOR 1883.

The policy of restriction wisely determined upon by the mine-owners of Lake Superior has been rigidly adhered to during the year, resulting in a total decrease of 548,855tons, or 19.5 per cent., as will be seen by the following interesting figures of shipments furnished by that standard authority, the Marquette (Mich.) Mining Journal:

	1883.	1882.	Decrease.	P. c.
From L'Anse	66,009	76 543	4,534	6.4
" Marquette	709,804	944,550	234,746	24.8
" Escanaba	1,246,876	1,735,259	208,383	17.8
" St. Ignace	59,445	60,637	1,192	1.9
Total.	2,262,134	2,810,989	548,855	19.5

The Mining Journal says: "The general summing up will show the total output of the Lake Superior mines the present year to be something over 2,350,000 tons—an increase over any preceding year except 1880." The Lake Superior shipments for the past seven years have been as follows:

Year	Tons.	Year.	Tons.
1877	965,057	1881	2,199,477
1878	1,101,206	1882	2,810,511
1879	1,303,679	1883	2,218,750
1880	1,850 625		

Thus the large decrease this year after all leaves the shipments substantially the same as in 1881, when they were larger than ever before. The shipments having increased uninterruptedly from 1877 to 1882, and being nearly 200 per cent. greater in the latter than in the former year, it can hardly be matter for surprise that at last there should be a reaction. After all the shipments this year are 20 per cent. more than in 1880 and 70 per cent. more than in 1879.

AMERICA'S PLACE AS AN ORE PRODUCER.

Great Britain, of course leads the world in the production of iron ore. Her product in 1882 was 16,627,000 tons, that of the United States 9,000,000 tons, and that of Germany 8,150,162 tons. Spain comes next with a product of 5,000,000 tons, and the other European countries drop to 1,000,000 tons and under. The total estimated production of the entire world last year, according to Mr. James M. Swank, was 46,777,299 tons, of which the United States produced 19 per cent.

A New and Economical Belting.

A foreign exchange reports that the latest patent in bands used for machinery is one for an invention by which it is claimed the only good belt made of textile fabric can be produced; it is not affected by change of temperature, stretches very little, is thoroughly waterproof, is as durable as leather, and being without the objectionable joints and splicings of a leather belt, it runs straighter and truer. The belt is made solely of the best Russian flax, and in price is from 25 to 60 per cent. cheaper than leather belting. The unusual strength of the belting results from its being folded somewhat peculiarly, and which also accounts for its stretching so little. It is rendered water proof by an entirely new process known only to the Russian Government, the peculiarity of which process gives it a marvelous grip of the pulley, and, no matter how long the belt is used, this never leaves it. The flax belt has been in use in Russia for more than two years and a half, and it has given the greatest satisfaction.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, Dec 21, 1883.

IRON ORE.

Interesting facts as to the amount of ore left on dock at the close of navigation this year at all Lake Erie ports, as well as total receipts, are given elsewhere. But little has been doing in the local market the past week, nor is much expected at this time of the year. Shipments the past week have been 11,646 tons, against 15,243 tons last week. No change in the market is to be expected for two or three weeks yet. We quote:

No. 1 Specular and magnetic Bessemer Ores per ton	$6.50@ 7.00
No. 1 Specular (non-Bessemer) ores per ton	6.00@ 6 25
Bessemer Hematites	5.00@ 5.25
Non B semer Hematites	4.75@ 5.00
Menominee Range Bessemer	6.25@ 6.50
Menominee Range non-Bessemer	4.75@ 5.50

PIG IRON.

"In dull years," said one of the largest firms, "there is never any business during holiday week, and this week has been duller than the dullest." As compared with 1882, the amount of trade has been about the same, though the transactions of this month are no indication of the general condition of the market. We quote:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$23.00@25.00
No. 2 Lake Superior charcoal	23.00@25.00
Nos. 3 and 4 Lake Superior	23.00@26.00
Nos. 5 and 6 Lake Superior	23 00@25.00
Nos. 1 2, 3. 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28.00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.00@22.00
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.00@21.00
No. 2 same	19.50@20.50
No. 1 foundry, native Ohio ores	21.00@22.00
No. 2 same.	19.00@20.50
No. 1 silvery, native Ohio ores	21.00@22 00
No. 2 same	18.00@20.00
No. 1 gray forge, red short	18.50@19.50
No 1 gray forge, neutral	17.50@18.50
No. 1 Bessemer	21.00@22.00
No. 1 "Arnold" American Scotch	24.00
No. 2 " " "	23.00

MANUFACTURED IRON.

There is no change in quotations to note. The trade for the present month, as compared with the trade for December, 1882, is considerably lighter in volume and the prices have favored buyers, who can invest without risk of serious losses by further decline. The stoppage of rolling mills and nail factories will so reduce the output that the opening spring trade will be in great contrast with the dullness that now prevails. There are abundant facts and figures to support this prediction and those who keep their stocks up and well assorted will be wise in their day and generation.

The American Iron and Steel Association states that prices are about steady, and owing to the restriction of production there will likely be no further depression. Mr. B. G. Clarke, President of the Thomas Iron Co., New York, is reported as saying that with the exception of rails, the iron trade looked well. His company had shipped more iron in the last three months than in any corresponding time in its history. The orders for delivery during the coming year were over 40,000 tons, which was as large as the company had expected to receive throughout the whole year.

HARDWARE.

The winter weather has improved trade somewhat the past week, though about the usual holiday quiet prevails. Compared with December of last year, neither trade nor collections are as good. The outlook for 1884 is generally hopeful, though a light trade is generally anticipated. Merchants generally will be conservative in credits and in ordering goods for future wants.

NAILS—Prices are a little firmer on account of the shutting down of the nail mills, which is to occur tomorrow. It is predicted that nails will be scarce by February 1, 1884.

MACHINERY OILS.

Prices on animal oils are firm, but trade is light doubtless on account of holidays and preparations for January settlements. There is no change in mineral oils.

COAL.

The market is quiet and prices are unchanged. While some dealers think the volume of trade for December compares favorably with that of Decembr, 1882, others report it only two-thirds that of last December. The anthracite coal tonnage of all the carrying companies for eleven months of 1883 is 29,659,886 tons, an increase of 3,139,229 tons as compared with the same period last year.

CINCINNATI PIG IRON MARKET.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

Although the market remains unchanged since our last so far as prices are concerned, the prospect for the near future grows brighter. Inquiries are numerous and generally for large amounts, also for early delivery. It is a showing of short stocks of Pig Iron in the hands of consumers. In view of this and the comparatively light stocks in the hands of producers, there seems to be no doubt but that the market will soon take a turn for the better. The mills remain very active with a full quota of orders at fair prices. We quote as follows:

FOUNDRY.—Hanging Rock Charcoal, No 1, $22 50@$23 50; Hanging Rock Charcoal, No. 2, $21 25@$22 25; Strong Neutral Coke, No. 1. $19 00@$20 00; Strong Neutral Coke, No. 2, $18 00@$19 00; American Scotch, No. 1, $18 00@$19 00. GREY FORGE.—Neutral Coke, $16 25@$16 75. Cold Short, $16 00@$16 50; CAR WHEEL AND MALLEABLE—Hanging Rock, Strictly Cold Blast, $27 75; Hanging Rock Warm Blast. $24 00@$24 50; Lake Superior, Charcoal all grades $24 00@25 00; Southern Car Wheel Strictly Cold Blast, $26 50@$27 50.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

A good deal of business has been in sight, the past week, mostly in the form of offers for large lots, nearly all of which have been declined. Some round lots, however, for future delivery have been closed at full present asking prices. Beyond these large transactions business has been very light, everyone waiting to see the end of the year before placing orders. In the main the market looks stronger than a week ago. The splendid showing of earnings which the railroads continue to make, and the large orders recently given out to the leading car works for rolling stock do not look as if there were any serious trouble with business in general. All indications point to a good demand for pig iron after the first of the year, and, spite of threatened tariff legislation and Presidential politics, a fairly prosperous year. We quote for cash:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $22 50@$23 50; Hanging Rock Charcoal, No. 2, $20 00@22 00; Southern Charcoal, No. 1, $21 00@$22 00; Strong Coke, No. 1, $19 00@19 50; Strong Coke, No. 2, $17 50@$18 50; Strong Coke No. 3, $17 00@$18 00; Soft Stone Coal, No. 1, $19 00@$20 00; Soft Stone Coal, No. 2, $17 50@$18 50. Forge—Strong Neutral No. 1, mill 16 00@$16 50; Cold Short No 1 mill, $15 50@$16 00. Car Wheel Malleable—Hanging Rock Cold Blast $30 00@$31 00; Hanging Rock Warm Blast $23 00@26 00; Southern Car Wheel Iron $25 50@$26 50; Lake Superior Car Wheel Iron, $24 50@$25 50; Lake Superior Malleable Iron, $24 50@$25 50.

PITTSBURGH PIG IRON MARKET.

[Reported for the TRADE REVIEW by A. H. Childs, 83 4th ave.

The market remains quiet and no change of importance is likely to occur at least until after the holidays Quotations are:

No. 1 Foundry, $20 00@21 00, 4 mos.; No. 2 Foundry, $18 00@19 00, 4 mos.; Gray Forge, $17 00@18 50, 4 mos.; White and Mottled, $16 50@17 00, 4 mos.; Warm Blast Charcoal, $22 00@26 00, mos.; Cold Blast Charcoal, $24 00@30 00, 4 mos.

LOUISVILLE PIG IRON MARKET.

Reported for the TRADE REVIEW by Geo. H. Hull & Co.

The market is quiet and sales are light. Some large buyers in the interior are making inquiries, for future deliveries six and twelve months ahead. Furnaces, however, are showing great reluctauce to quote for future delivery, running over two or three months. We quote for cash in round lots as below:

FOUNDRY IRON.—Hanging Rock Charcoal, No. 1, $23.00@$24.50; Southern Charcoal, No. 1, $21.50@$22.00; Hanging Rock Stone-coal and Coke, No. 1, $19.50@$21.00; Southern Stone-coal and Coke, No. 1, $19.00@$20.00; Southern Stone-coal and Coke, No. 2, $18.00@$19.00; "American Scotch," $18.00@$19.00; Open Silver Gray, $18.00;@$19.00 Close Silver Gray, $16.50@$17.50. MILL-IRONS.—No. 1, Charcoal, $19.00@$20 00; No. 1, Stone coal and Coke, Neutral, $16.50@$17.00; No. 2, Stone-coal and Coke, Neutral, $15.50@$16.00; No. 1, Stone-coal and Coke, Cold Short, $16.00@$16.50; No. 2, Stone coal and Coke, Cold Short, $15.00 @$15.50; White and Mottled, Cold Short and Neutral, $14.50@$15.00. CAR-WHEEL IRONS.—Hanging Rock, Cold Blast, $30.00@$31.00; Hanging Rock, Warm Blast, $23.00@$24.00; Alabama and Georgia, Warm and Cold Blast, $23.00@$28.00; Central Kentucky, Cold Blast, $26.00@$27.00.

CLEVELAND'S INDUSTRIAL POSITION IN 1883.

[Concluded from Page 7.]

1882, 71,648 tons; shipments, 1882, 1,449 tons; receipts, 1883, 138,751 tons; shipments, 1883, 1,745, tons.

COAL—BITUMINOUS.

Month.	1882. Receipts	1882. Shipm'ts	1883. Receipts	1883. Shipm'ts
January,	78,224	5,712	74,382	2,640
February,	76,688	5,099	73,905	4,290
March,	87,934	6,223	89,501	2,951
April,	154,553	14,491	92,445	1,997
May,	139,412	34,133	133,029	65,242
June,	157,005	58,710	145,410	69,050
July,	166,320	53,505	155,169	82,310
August,	122,900	58,052	142,862	68,934
September,	159,520	56,289½	123,594	47,246
October,	154,271	61,591	162,597	67,542
November,	124,333	53,111	130,009	55,468
December,	96,219	5,012	47,415	3,435
Total.	1,517,379	411,949½	1,351,318	471,105

COAL—ANTHRACITE.

Month.	1882. Receipts	1882. Shipm'ts	1883. Receipts	1883. Shipm'ts
January,	12,344	323	5,394	429
February,	3,107	322	3,793	462
March,	2,184	386	3,321	672
April,	2,172	147	2,799	334
May,	3,212	8,341	6,384	86
June,	13,758	195	9,996	12
July,	15,565	438	8,191	118
August,	12,977	2,881	10,905	364
September,	8,401	333	9,967	513
October,	11,822	228	9,999	5,109
November,	9,892	346	13,693	2,957
December,	10,138	327	5,149	387
Total.	105,572	14,264	89,591	11,444

Letters to the Editor.

Progress of the Stationary Engineers' Association.

TO THE EDITOR:

DETROIT, Mich., Dec. 16.—The National Association of Stationary Engineers is growing beyond our most sanguine expectations. We now number 40 associations, with a membership of nearly 2,000. Our "Aid" Association is getting in working order, and by January 1, there will be undoubtedly 500 members connected with it, thereby insuring, in case of the death of a member, the sum of $500 to his family. Associations are now in process of formation in several cities, and applications are expected in the near future. There are many cities whose engineers have as yet made no move towards organizing. We would be pleased to correspond with any engineers or proprietors regarding the objects of the organization of associations. One thing to be remembered is: We are not trades union, but a school for the education of the steam engineer. Constitutions and Minutes of our meeting in October will be sent to any address.

A. M. DAVY,
Secretary.

Recent Ohio Patents.

MR EMMET N. BARBER, of Kent, has patented a lumber measure that will accurately register the aggregate number of feet, board measure, of boards of any width and length, the length being known to the operator.

AUGUST KINDERMANN, of Cleveland, has invented a vapor burner. In this heating apparatus the improvement consists of a burner-cap, having within it a central recessed downward projection, with series of orifices at both ends.

A COMBINED draft-retarder and flue-scraper invented by Isaac D. Smead, Toledo, consists of a removable spiral diaphragm for smoke and heat flues, and is made in sections, whereby more or less of said diaphragm may be used in the flue at will.

IN a monkey-wrench invented by James Houlehan, Toledo, the combination occurs of a cylindrical sliding shank carrying the lower movable jaw, a stationary shaft carrying a fixed jaw, spring-pawls, and a stationary ferrule and handle, the ferrule being constructed to receive and guide the shank.

IN a wrench invented by John Lee, Sterling, the combination consists of a shank; a movable jaw having an interior beveled recess; a wedge fitted in said recess adjoining the shank and having a stem extending below the jaw; and a burr mounted upon the lower end of said jaw and having a suitable thumbpiece and a spiral flange engaging a stud upon the stem of the wedge.

A MACHINE for the manufacture of fences is the invention of Jos. Zengel, Dayton. The pickets are fed between the wires by traveling belts and a knocker. The reel-frames rotate continuously. The twister-shafts rotate intermittingly, and move more rapidly than the reel-frames, and thus make up for the time lost while the shafts are stationary, so that the wires are not twisted around the reel-frames.

AN improved bag holder, for keeping a bag open while it is being filled, has been patented by Mr. Daniel F. Smith, of Republic. By a suitable arrangement of standards in connection with a platform, levers, and cross bars, the bag is supported and held open by an elongated elliptical spring band or hoop. This spring band or hoop may be locked in position, but when the bag is filled the free ends thereof are drawn together and the bag will be released.

New Advertisements this Week.

We call attention to the following new advertisements this week: Geo. Worthington & Co., Cleveland, hardware merchants; The Babcock & Wilcox Co., New York city, manufacturers of water tube steam boilers; Young & Locke, Titusville, Pa., machinery, etc.; John A. McGowan & Co., Cincinnati, steam pumps; The Kimball Water Motor Co., Toledo, water motor; D. A. James, Akron, office cabinet work.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz	$18 40
Ship..... " "	18 75
Heavy railroad.. " "	19 50

Axes.

	per doz.
James' 2d qual	$7 00
Buckeye	7 75
" doub. bit	15 00
Hunt's	9 50
Mami's	8 00
Lippincott's Crown	8 50
Cut More	9 00
Peck's Double Bit	22 00
"Champion Blade	11 00
Good triple silver steel	11 50

Axles.

Standard list,....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

	per lb.
Eagle, Amer	10c dis 20
Wright's	11¾c@11c
Armitage's Mouse Hole	9½c@9¾c
Trento	10¾c
Wilkinson's	10¾c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 50&10
do do do bits.....50&10
D C gimlet do Ives.. dis 50
Snells bits .....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's..... 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 00
Turn Table..... 4 50

Bolts.

Machine.....dis 70
Plow.....dis 40
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts.....dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Fire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
B. B. & W.....dis 40
Bolt Ends 16c. per lb. net..70

Bellows. Dis

Hill,s.....40 pr cent
Bl'ksmith's com new list, 50 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts. Dis

Wrought brass	70
Cast, loose joint	60&10
Pin, loose	60&10
Wrought, fast joint narrow	50&10
Wrought fast joint broad	50&10
Wrought loose joint broad	55&10
Wrought table and back flaps	50&10
Loose joint, without acorns	55&10

Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"–Standard Quality.
C. No. 1.....4 50
C. H. No. 1 Shell.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox.....
T. S., 60,000 .....(as per)..6 50
T. S., 65,000 .....(act of)..
Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.–Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch .... dis 25
"National" Special Locomotive Tubes.....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears ..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch ....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander ..dis 15
Boiler Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes ....net list
Anvils—'Peter Wright' 12½ ℔ lb
Solid Box Vises net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½ inch, per doz		5 50
5	do do	7 50
6	do do	9 50
7	do do	11 00

Charcoal Iron

4½ inch, per doz	2 50
5 do do	3 50
6 do do	4 50
7 do do	5 50

Planished Amer. Russia Iron

4½ inch per doz	5 00
5 do do	6 50
6 do do	8 50
7 do do	9 50

Discount 33⅓ per cent

Chisels.

Hot and cold cutting	℔ lb 30
Railroad track	30
Machinists	30
Mallet head	50
Jape	50
Packing	50
Stone cutters	50

Crowbars.

Cast steel	℔ lb 7
Iron, steel points	5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co.....dis 35
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co., table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dis 45

Coopers' Tools.

Bradley's	dis15@20
Braton's	dis15@20

Chains.

Coil by cask,.....

3-16	¼	5-16	⅜	7-16	½
9	7½	6 15	560	5 10	495

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox....dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers	℔ lb 6c
Flour and F. F	℔ lb 4c
B. & A. Emery Paper	dis 35
Sand paper	dis 35

Enameled & Tinned Ware.

Kettles	dis 50
Sauce Pans	dis 30
Tinned Sauce Pans	dis 30

Files.

Parkin's $5 to £.. dis 45 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps .....dis 35
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Berea	1@1½ ℔ lb
Ohio	1¼@1½ ℔ lb
Nova Scotia	1¼@1½ ℔ lb
Lake Huron	1@1½ ℔ lb

Hammers.

Maydole's	dis 15
Cheney's	dis 25
Hartford Hammer Co	dis 20
Humason & Beckley	dis 50
Verree	dis 5

Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 45
Kip's.....dis 25

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50,$8 00,$8 50, dis 40
Claw,
Nos...1, 2, 3,
℔ doz $8 25,$8 75,$9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔ doz $7 50,$8 00,$8 50, dis 40

Hinges.

Champion double acting spring hinges .....dis. 30
Screw & Strap 6@12 in..... 4c
" " 14 in. & larger 3c
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co .....70&10

Locks.

Whipple Mfg Co ..... 50 &10
Norwalk Lo Co ..... 50&10

Nails.

20 to 60d	$2 60
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
¾ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1¼ do do do	1 75
1 do do do	2 50
¾ do do do	3 00
Cut spikes, all sizes	35
Clinch nails, all sizes	1 75
Casing and box nails	75
Finishing nails,	$1 25
Tobacco nails,	50

Nuts and Washers

Nuts, square	3c off list.
Nuts, hexagon	9c. off list.
Washers	7c off list.

Nuts, Bolts, etc.

Machine Bolts	dis 70
Bolt Ends	dis 70
Boiler Patch Bolts	net list

Picks.

Railroad, 4 to 5 lbs.. doz	$6 60
5 to 6 lbs..	7 20
to 7 lbs..	7 80
7 to 8 lbs..	8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz	10 80
Mill Picks per lb.....	75c

Planes.

Ohio Tool Co	dis 20
Sciota	dis 25
Bailey's Pat. Adjstbledis	20@10
Sandusky, fancy	dis 15
Buckeye	dis 20
Ogontz	dis 25

Rivets.

Iron	dis 45
Tinned	dis 45
Copper	dis 50

Rules.

Stanley..... dis. 70 & 10

Squares. D..s

Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch .....4 c
do do do 5-16 ..... 3½ c
do do do ⅜, 7-16 & ½ in 3

Shovels and Spades.

Ames' new list, July 1, 1881,	dis 15
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 30
Bishop	dis 50
Chisholm	dis 25@30
Rowland's	dis 50
Griffiths	dis 50

Sad Irons.

From 4 to 10 lbs.. per lb	3 net
Self-Heating ℔ doz	$9 net
Tailors ℔ doz	$18 net
Gleason's Shield and Toilet	dis 25
Breast, P. S. & W	dis 20&10

Drawing Knives.

Peck, Stow & Wilcox	dis 70
Witherby's	dis 65@10
Nobles Mfgr. Co	15
Adjustable handle	20

Emery and Sand Paper.

Regular Numbers	℔ lb 6c
Flour and F. F	℔ lb 4c
B. & A. Emery Paper	dis 35
Sand paper	dis 35

Enameled & Tinned Ware.

Kettles	dis 50
Sauce Pans	dis 30
Tinned Sauce Pans	dis 30

Files.

Parkin's $5 to £.. dis 45 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps .....dis 35
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Berea	1@1½ ℔ lb
Ohio	1¼@1½ ℔ lb
Nova Scotia	1¼@1½ ℔ lb
Lake Huron	1@1½ ℔ lb

Hammers.

Maydole's	dis 15
Cheney's	dis 25
Hartford Hammer Co	dis 20
Humason & Beckley	dis 50
Verree	dis 5

Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 45
Kip's.....dis 25

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50,$8 00,$8 50, dis 40
Claw,
Nos...1, 2, 3,
℔ doz $8 25,$8 75,$9 25, dis 40
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Boiler Patch Bolts	net list

Scales.

Hatch, Counter, No. 171...
℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks' ..... dis 20
Buffalo Scale Co..... dis 40
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Screws. Dis

Flat head iron or steel [new list] per cent dis.	55
Flat head brass	55
Round head iron or steel	50
Round head brass	45
Brass and Silver capped.	35
Japanned, list of Plain Screws	40
Coach, patent Gimlet point, list per 100	65
Lag, taper points	70
Bed	10
Machine, flat head, iron.	55
round head, iron	50
Bench, iron	55&10
wood, beech, per doz $3	10
wood, hickory	20&10

Tinners' Tools & Machines.

Machines (P. S. & W.)	less 10
Tools (P. S. & W.)	" 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe	dis 60&10
Malleable Iron Fittings	20
Grey Iron Fittings	dis 50
Steam Brass Goods	dis 55
Water " "	dis 50
Ludlow Gate Valves	dis. 20
Register Gauge Cocks	net 1 00
Montg'ry Gauge Cocks	$1 each
Steam Gauges	dis. 40
Steam Guages 5 in. net dial per doz	30 00
Scotch Glass Tubes	dis. 70
Tools	special.
Duplex Injectors	net.
Soil Pipe & Fittings, Mott's List	dis. 30
Sinks, Mott's List	dis. 25
Copper Bath tubs, sinks, etc	dis. 25
Galvanized Iron Boilers "Scalfes."	dis. 50
Marble Slabs, Counter-sunk net per ft.	$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

⅛, ¾, 11-16, and ½ in. diam. 5 00

Valves. Dis.

Jenkins' Patent Gate Valves	35
" " Globe	40
" Standard Packing "	20

Vises.

Solid "Crown" (A. H. Hildick)	40 to 100 lb. 15c net
Solid, Peter Wright's	15½
Solid, Wilkinson's	13½
Parallel, Parker's	dis 40
" Simpson	dis 20
" Prentiss	dis 15
Saw Filers, Hopkins'	℔ doz $17.50, dis 10
" Wentworth's	9 00
Cowell Hand Vises	dis 20
Richardson's Vise and Anvil	dis 25

Wrenches.

Coe's genuine	50
Girard Standard	dis 50 & 10
Mechanics' 10 and 10	dis. 50c
P. S. & W. Mechanics	dis 50&10
Agricultural	dis 70
Campfield & Sutiff "best"	60
"medium"	70&10

Wire.

Brass and Copper	dis 30
Bright & annealed, Nos. 0 @ 18	dis 60@65
" " Nos. 19 @ 26	dis 65
" Nos. 27 @ 30	dis 70
Coppered Nos. 0@18, dis	55@60
Galvanized, Nos. @18, market list,	dis 45@50
Tinned, Nos. 0 @ 18, dis	45@47½
Cast steel	dis 40
Tinned Broom Wire, Nos. 18@25	dis 55
Annealed Fence, Nos. 8 and 9	dis 65&5
Annealed Grape, Nos. 10 to 14	dis 65&5
Galvanized Telegraph, Nos. 7 to 9	℔ 1
Galvanized Telegraph, Nos 10 to 11	℔ lb 8½c
Galvanized Telegraph, No. 12	℔ lb 10½c
Fence staples	℔ lb 5½@5½c
Fence Staples, galvanized,	℔ lb 6½@6½c
Stubs Steel Wire $6 00 to dis	35
Barb Wire, painted	5c
Barb Wire, galvanized	6c
Crucible Steel Ropes fro in. at 9c to 1¼ in. at	⅝ 32c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at	33c

TINNER'S STOCK.

Tin.

Banca.....per lb.	23½
Straits "	22½c
English "	22½c
Bar "	23½c

Tin Plate.

IC 12x12 charcoal	$ 6 65
IC 14x20 do	6 35
IX 14x20 do	8 10
DC 12½x17 do	7 00
DX 12½x17 do	9 00
DXX, 12½x17 do	11 00
DXXX, 12½x17 do	13 00
IC, 20x28 do	13 50
IX, 20x28 do	17 00
IC, 14x20, Best Roof	5 90
IX, 14x20, do	7 65
IC, 20x28 do	12 00
IX, 20x28 do	15 50
IC. 10x14 Best Coke	5 85

Subject to card discount.

Solder.

Half and Half, in bars	14½
No. 1 do	13½
Spelter Solder	25

Fat Planished Sheet Iron

A	per lb			10½c
B	"			9c
Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-10	3-30	3-40	3-75
Char	5-60	5-00	6-00	6-20

Sheets over 28 in. wide ½c extra.

Zinc.

Sheet, cask	6½c
Sheet, open	6¾c

BRASS.

Cash prices for Roll and Sheet Brass For less quantity than 100 lbs. add 3c per lb.

High Brs

All Nos not thinner than No 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
½c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb, advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ½ in. to ¼ in. thinner than No 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot	15½@16c
Baltimor	14½@15c
Arizona	15@15 c
sheathing Brazier Copper, Bolts, etc.	
All sizes, 16 oz. per sq. foot. and over. per lb	22c
ad over per lb.	22c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb.	22c
Brazier's Copper, 10 oz. and 12 oz. per sq. ft. per lb.	24c
Brazier's Copper lighter than 10 oz. per sq. ft. per lb	33c
Circles less than 84 inches in diameter. per lb.	33c
Circles 84 inches in diameter and over .....per lb.	30c
Segment and Pattern sheets per lb.	33c
Locomotive Fire Box sheets per lb.	30c
Sheathing Copper, over 12 oz. per sq. ft... per lb.	24c
Bolt Copper.....per lb.	28c
Copper Bottoms per lb.	24c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48	per sheet 6c

All other size sheets, 2½c per square foot For tinning i th sides, double the above amot.

LEAD.

Americ'n, ℔ lb	4½c
Bar, ℔ lb	5½c
Pipe, ℔ lb 6¾c dis 10 per ct	
Sheet, ℔ lb 7¾c dis 10 per ct	
Tin-lined pipe 15c dis 10 per ct	
Block	45c.
Chilled Shot	8c

Babbitt Metal.

Babbit Metal, No. 3. 14 X	42
Pabbit Metal, No. 2. 16 XX	46
Babbit Metal, No. 1, 18 XXX	50
Babbit Metal, C	30
Babbit Metal, B	24
Babbit Metal, A.	32

Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to ½ inch	1 80	
4½ to 6 by ⅜ to 1 inch	2 00	
1¾ to 6 by 1⅛ to 1¼ inch	2 30	
1¼ &1¾ by ⅜ to ½	2 00	
1 & 1¼ by ⅝ to ⅜	2 10	
⅝ & and ¾ by ⅜ to ½	2 30	

Round

1 to 1⅜ inch	1 80
2 to 2⅜	2 10
2⅝ to 3¼	2 40
3⅜ to 4	2 90
4⅛ to 4⅝	3 40
4⅝ to 5	3 60

Square.

1 to 1⅜ inch	1 80
2 to 2⅜	2 10
2⅝ to 3¼	2 40
⅜ to 4	2 90
3⅜ to ½	2 00

Heavy Band.

1¼ to 6 by ⅛ and 5-16 inch 2 10
1 to 1¾ by ⅜ and 5-16 do 2 20
⅝ to ⅞ by ⅛ and 5-16 do 2 40
⅝ to ½ by ⅛ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ⅛ and ¼ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ⅛ to 3-16..... 2 70

Hoops.

1¼ to 2 , Nos 16 to 18	3 10
1¼ to 4 do 13 to 15	3 00

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	3 50
No 25 to 26	3 70
No 27	3 90
No 28	4 30

English Steel.

Best cast	℔ lb 16c
Extra cast	16½c
Round machinery	10c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16½c
Spring calking	7¼@7½c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	13½c

American Steel.

Best brands of refined cast steel, ¼ to 2 inches	12c
Crucible cast	7c
Open-hearth ditto	4½c
Hammer cast steel	9c
Spring cast steel	¾c
Bessemer and open-hearth spring	½c
Ditto plow	½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7½@7c
Tire	4
Sleigh shoe	4

Bessemer Steel Tire.

⅝ to 1 by 3-32	4 ℔ lb
⅝ to 1 by ⅛ to 5-32	4 ℔ lb
⅝ to 1 by 3-16 to ¼	4 ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	10
Axle steel for wagons	7
Frog points and plates	8
Frog size bars	8
Pick, hammered	10½
Mattock, beveled	9
Table cutlery	7½
Trap spring steel	10
Pike and cant hook	8½
Coal and granite	9

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES.

	Per Ton
No. 1 h R wro't scrap	$20
No. 1 wrought scrap	19
No. 1 Machine cast scrap.	14
Stove plate (free from burnt iron)	11 00
Grate bars	8 50
Pipes and flues (clean)	15
Tank iron	14
Hoop and band iron	10
Light sheet iron	9
Axle turnings	15 00@16 00
Wro't turning (f from cast)	13
Wro't iron, oily drillings	9@10
Cast borings	9 00
Malleable iron	9
Uncut wro't iron boilers	15
Old copper per lb	15
No. 1 H. Brass per lb	11
Heavy yellow Brass do	9@11
Light Brass per lb	7@9
Scrap Zinc per lb	2@3
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	24
¼	08	$0 11	.54	42
⅜	09	12	.67	56
½	11	15	.84	85
¾	13½	19	1.05	1.13
1	19	26	1.31	1 67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2 60
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7 55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	10 73
4½	1 75	2 40	5.00	12 49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	28.00
8	4 75	....	8.62	28.00
9	6 50	....	9 68	34 44
10	8 00	....	10 75	40.64
12	12 00	....	....	54.65

Discount, car load lots, 70 and 10 per cent. Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 50
Massillon	2 70@3 00
Palmyra, lump	3 25
Brier Hill	3 25@3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 40
New Hazelton	2 50
New Hazelton, mix	1 20
" " nut	2 00
Connotton	2 25
Connotton, mix	1 20
" nut	2 00
Anthracite grate	5 40
Anthracite egg	5 56
Anthracite stove	5 85
Anthracite chestnut	5 98

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump	3 75
Straitsville, nut	3 50
Palmyra, lump	4 25
New Hazelton	3 50
Connotton	3 00

75c less on cars by car load.
Anthracite Stove and Chestnut 6 75
Egg and grate 6 50

OILS.

Pure Oils. p'kages included	
Sperm, winter bleached per gal	1 28@1 33
Whale, winter bleached per gal	68@70
Straits	48@53
Bank	46@50
Lard oil extra W S	70@73
do No 1 do	58 @60
do No 2 do	53@55
Tallow oil	70@75
Neatsfoot oil pure	95@$1 00
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	51@54
do do yellow	50@53
West Virginia lubricating 25 deg	13c@18c
Paraffine oil winter pressed	17@20
Capitol Cylinder	75
Model do	60
Eldorado Engine	45
Turpentine, per gal	42

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	8 00
11x14 to 15x24	9 00
16x24 to 20x28	10 25
15x34 to 24x30	11 25
26x28 to 24x36	12 50
26x36 to 26x44	13 50
26x46 to 30x50	14 56

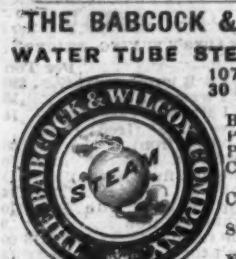
DOUBLE THICKNESS Dis50&20

6x8 to 10x15	12 25
11x14 to 15x24	13 75
16x24 to 20x28	16 25
15x34 to 24x30	17 75
26x28 to 24x36	18 50
26x36 to 26x44	20 75

Dis 70

THE BABCOCK & WILCOX CO.

WATER TUBE STEAM BOILERS



107 Hope St., Glasgow.
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Branch Offices:
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Philadel. 32 N. 5th St.
Pittsburgh, 91 4th Av.
Chicago 64 S. Canal St.
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Havana, 50 San Ignacio
Send to nearest office for circular. 42

Young & Locke,

DEALERS in New and Second-hand

Machinery, Engines, Boilers

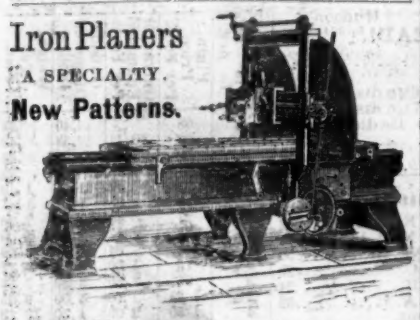
and Pumps. Gas and Steam Pipes of every description.

25 TITUSVILLE, PA.

Iron Planers

A SPECIALTY.

New Patterns.



This Planer returns the table 3 for 1.

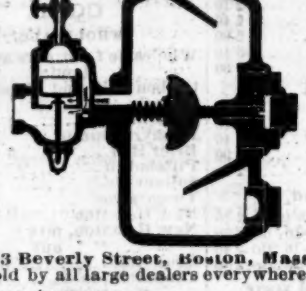
Rochester Machine Tool W'ks

LIMITED.

7x26x26 on hand. 34 Rochester, N. Y.

The Curtis Expansion Trap,

Curtis Regulator Co.,



Manufactured by the

153 Beverly Street, Boston, Mass.
Sold by all large dealers everywhere.

GENERAL AGENCIES—
109 Liberty Street, New York.
86 and 88 Market Street, Chicago.
925 Market Street, Philadelphia.
59 Holliday Street, Baltimore. 44

THE MILLER CO.

CANTON, OHIO.

Manufacturers of the

Ohio Farm, Church, School and Factory

BELLS.

Also very superior strong, soft and clean CASTINGS. If you have failed to get difficult pieces elsewhere give us a trial.

Sole manufacturers of the 44

Torrent and Unique Steam Pumps.

REMOVAL.

GEO. WORTHINGTON & CO.,

Hardware Merchants,

Beg to announce their removal to

59 & 61 St. Clair Street,

next door on St. Clair to our Old Store. With increased facilities, in a much larger store, we invite the patronage of our friends and the public.

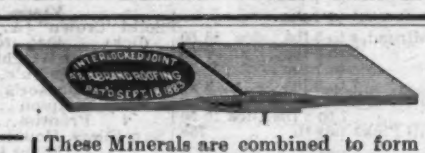
Geo. Worthington & Co.,

21 Nos. 59 and 61 St. Clair Street.

Address, TAYLOR MFG. CO.

(Please Mention this Paper.) Chambersburg, Pa.

Asphalt and



Asbestos.

Manufacturers of
Roofing Felt,
Slaters' Felt,
Roofing Pitch,
Roofing Paint,
For Tin and Iron Roofs.
Asphalt,
Asbestos and
Black Varnish, etc.

These Minerals are combined to form the Protective or Surface Coating for our **"A. & A." Brand Patent Interlocked Ready Roofing.** The only way of making a perfectly water-tight joint in Ready Roofing. We have the references that will convince you that this Roofing is DURABLE, FIRE, WATER and ACID PROOF. Easily applied; one-third the cost of tin. A trial order at very low price. Circulars and Samples free.

Cincinnati Roofing Co.,

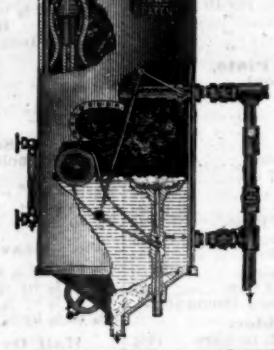
CINCINNATI, OHIO. 24

Established 1841.] THE MERCANTILE AGENCY. [94 Branch Offices.
R. G. DUN & COMPANY, Proprietors.

This establishment supplies (to subscribers only) all necessary information as to the standing, responsibility, etc., of merchants, traders, manufacturers, public companies, etc., through the United States, their Territories and British North America. Also, makes collections and attends to legal business generally. It is the oldest and by far the most complete and extensive system ever organized for the accommodation of banking and mercantile interests and for the general promotion and protection of trade. Reference books published quarterly. Cleveland Office—Rooms 4 and 5, No. 121 Superior-st. Terms of subscription made known on application. R. P. CATTRALL, Manager. 2

Iron Roofing,

CHEAPEST AND BEST IN USE, AND
BEST IRON PAINT
for new or old buildings, of all kinds.
Manufactured by
T. C. SNYDER & CO.,
CANTON, OHIO.
Send for circular and price list.
An agent wanted in every town. 1



Stewart Heater Co.,

Manufacturers and Patentees of STEWART'S

Patent Heater Purifier and Water Catcher

COMBINED, the most efficient Heater in the market. Also manufacturers of

SINGLE AND DOUBLE

Plunger Boiler Feed Pumps

with Bronze Metal Valves and Plungers, with new device for connecting the Rod to Plunger.

Send for illustrated Catalogue.

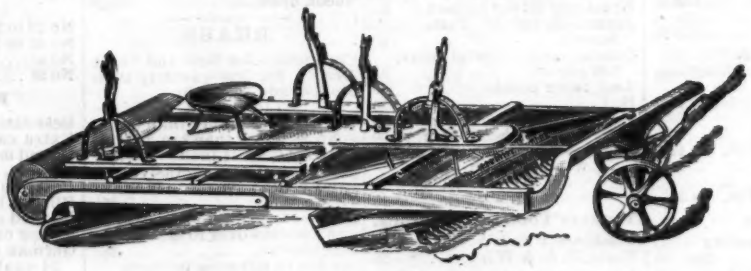
STEWART HEATER CO.,
15 56 to 60 Mechanic Street, BUFFALO, N. Y.

The Griffin Road Machine Co.

MANUFACTURERS OF

Road and Track Machines,

Elyria, O.

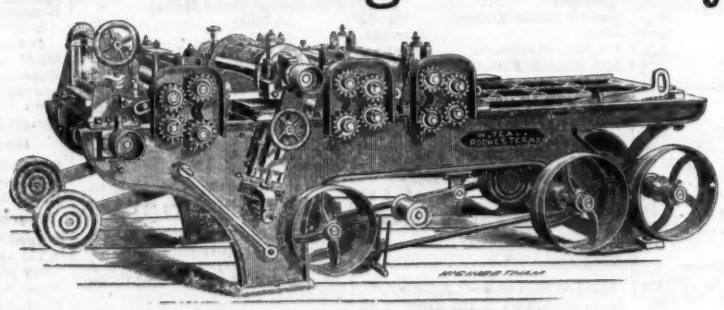


CITY SURVEYOR'S OFFICE,
LANSING, MICH., May 8, 1883.

The Griffin Road Machine Co.
Gents.--We have had your machine running for a month, and are highly pleased with it. It has already more than paid for itself by the saving of labor. H. D. BARTHOLOMEW,
City Surveyor.
22

Wood-Working Machinery.

Length of Frame, 10 feet.



Weight, 3,000 to 4,700 Pounds.

PRICES—NO. 2.

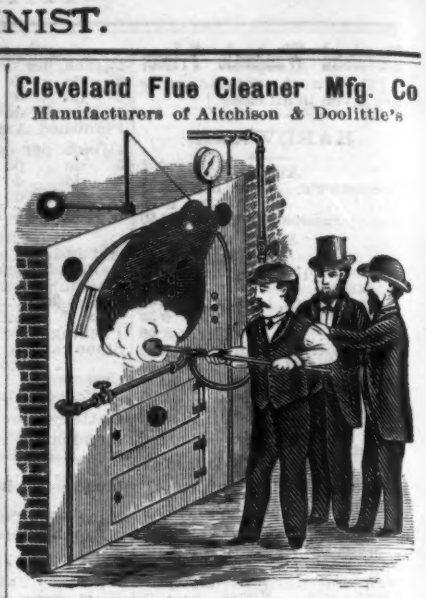
To plane on side and match, 4 rolls,	$500
To surface 1 side without matching 4 rolls,	400
To plane one side and match, 6 rolls,	565
To plane two sides and match, 6 rolls,	650
To plane 2 sides without matching, 6 rolls,	500

WILLIAM TEAL,

ROCHESTER, N. Y.

Cleveland Flue Cleaner Mfg. Co

Manufacturers of Aitchison & Doolittle's



PATENT STEAM

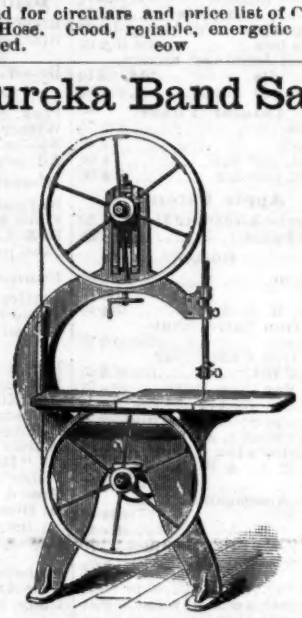
Flue Cleaner.

49 Power Block, Cleveland, Ohio.

The most simple, durable and economical. It saves from 15 to 25 per cent on labor and fuel.

Send for circulars and price list of Cleaner and Hose. Good, reliable, energetic agents wanted. eow 93

Eureka Band Saw.



We build three sizes of this machine

with 26, 30 and 38 inch wheels.

The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.

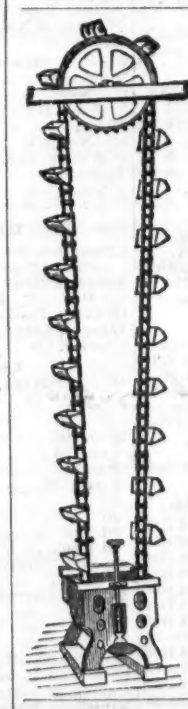
For further information address

FRANK & CO.,

Manufacturers of

WOODWORKING MACHINERY,

176 Terrace Street, BUFFALO, N. Y



ANTI-FRICTION

Roller Detachable

Chain Belting,

For Elevators, Conveyors, Carriers, etc., and for Driving Purposes.

Recommended as a superior chain belting, having greater wearing surface, and in connection with the Friction Roller, longer lived, than any similar belting.

Manufactured and sold by the

Lechner Mfg. Co.,

Columbus, O.

Send for Catalogue and Price List. 24

JOHN ADT & SON,

—BUILDERS OF—

HARDWARE MANUFACTURING MACHINERY.

Send for Catalogue.

NEW HAVEN, CONN., U. S. A.

WANTED.

TO LEASE a part or whole of a building suitable for the manufacture of heavy machinery. Size desired--if one floor--from 30 to 40 feet wide by about 120 long. If two floors, about from 30 to 40 feet wide by about from 60 to 75 feet long. Address Box 634, New Haven, Conn.
15

FOR SALE.
MALLEABLE IRON WORKS

of Akron. Two large Annealing Ovens with equipments for same; Japanning and Tinning Rooms; good Boiler and Engine of 25-horse power; machine and store house two stories, 25x50 feet, containing pulleys, hangings, benches, polishing barrels, etc.; Molding Foundry 50x70 feet, including cupola, ladles, crane, core-oven and air-furnace with a fine high stack.

Four buildings and one acre of ground well located. Shipping facilities the very best. Buildings and machinery all nearly new. The whole will be sold at a bargain and on reasonable terms of payment. Enquire of
A. B. TINKER, at Buchtel College.

FOR SALE—ENGINE.

FOR SALE the engine now running at my Factory, cor. East Prospect street and C. & P. R. R. Size, 9x18. Lord & Bowler make. In good order. I. N. TOPLIFF.
Cleveland, Dec. 22, 1883. 15

WANTED.

WANTED, a good mechanic in every machine shop and foundry to get up clubs for both the **Weekly** and **Monthly** TRADE REVIEW AND WESTERN MACHINIST. We give the best rates to clubs, and pay better commissions to those who get them up than any other journal published. For particulars or specimen copies address
DAY & CARTER, Publishers,
122 Water Street, Cleveland, O.

WANTED—SITUATION—By a practical machinist of seven years' experience at lathe work. Best of references. ddress T. F. L., care Trade Review, 122 Water Street, Cleveland, O. tf

FOR SALE—Dormant scale—with two iron columns and sliding poise; also double beam and graduated pendulum. Capacity, 2,500 lbs. Size of platform, 30x36 inch. Nearly new. Address DAY & CARTER, 122 Water street, Cleveland, O. tf

WANTED—PARTNER in two or three good paying manufacturing businesses. For particulars address F. H. & Co., care Trade Review.

FOR SALE, a fine piece of property on Jennings Avenue, of 500 feet, near the Nickel Plate Railroad. Well located for building or manufacturing purposes. We will sell this at a bargain, and invite a call.
A. D. MORTON & SON,
326 Euclid Avenue, Room 6. 10 tf

FOR SALE.—A first class medium CIRCULAR SAW MILL, new, never been used. Will be sold cheap. Address M. & Co., care Trade Review. 51-tf

THE YOUNG SCIENTIST.
A Practical Journal for Amateurs.

Tells about work of all kinds for Boys and Girls—Lathes, Scroll Saws, Microscopes, Telescopes, Boats, Athletic Sports, Experiments, Pets, Bees, Poultry, etc., etc. Finely illustrated.

$1.00 per Year. Specimens Free.

We have just issued, and will send to any address, our large Catalogue of Scientific and Mechanical BOOKS. They are new, thorough, plain and practical. Amongst others we publish, price $1.00 each,
Practical Carpentry. 300 Illustrations.
Hodgson's Steel Square and Its Uses. 75 Engravings.
Hand Saws: Their Use, Care and Abuse. 75 Engravings.
Plaster and Plastering. Numerous Engravings; 3 Plates.
How to Use the Microscope. 86 Engravings; 6 Plates.
How to Become a Good Mechanic. 15 cents.
Workshop Companion 35 cents.
Sent by mail on receipt of price.
Industrial Publication Company,
294 Broadway, New York.

AKRON
POLISHING
—AND—
PLATING
WORKS.

Stove Work a Specialty.
Cold, Silver and Nickel Plating. Work Guaranteed. We employ Improved Methods of our own in treating this work. Write for prices.
Akron, O.

Wood Rim Pulleys
of all sizes for double and single belts.
Also, SHAFTING, HANGERS and IRON PULLEYS.
Responsible agents wanted where I have none. Address,
W. A. Woodward,
Fletcher, cor Rock St., LOWELL, MASS.

TRAVELER'S REGISTER.

Lake Shore & Michigan Southern.

The time given is the new standard (Ninetieth meridian) time, which is thirty-three (33) minutes slower than Cleveland time.

TRAINS GOING EAST.	Arrive. From West.	Depart. For East.
Fast N. Y. Express	*1 07 a m	*1 22 a m
N.Y.,Bo't'n & At. Ex.	*6 37 a m	*7 02 a m
Elyria Accommodation	†8 07 a m	.....
Pt.Clinton Accomd'at'n	†10 37 a m	.....
Buffalo Accommodation	†10 37 a m	†10 52 a m
N. Y and B't'n Fast Ex.	*1 57 p m	*2 27 p m
Cincinnati and St Louis Ex	.....	3 27 p m
Conneaut Accom'dation	.....	†4 22 p m
Night Exp via Norwalk	† 9 42 p m	†10 07 p m
Night Exp via San'sky	9 44 p m	.....
TRAINS GOING WEST.	**Arrive. From East.**	**Depart. For West.**
Fast Limited Express	*11 55 a m	*12 05 a m
Mich. Ex. via Sandusky	*2 22 a m	*2 37 a m
Chi. Ex. via Sandusky	†6 07 a m	6 32 a m
Mich. Ac. via Norwalk	.....	†6 12 a m
Conneaut Accom'dat'n	†8 12 a m	.....
Toledo Ex. via Norwalk	†12 52 p m	†3 02 p m
St. Louis Ex. via San'ky	*1 02 p m	*1 25 p m
Chi. Pac.Ex. via Nor'lk.	*6 02 p m	*6 32 p m
Pt.Clinton Accom'dat'n	.....	†4 32 p m

Sunday trains for Nottingham—Depart 8:32 a. m. and 1:47 p. m., return at 9:37 a. m. and 4:17 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

Central standard time, 33 minutes slower than Cleveland time.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*6 40 A.M
No. 8 C. L. & W and Galion Exp	9 00
No. 12 St. Louis & New York Exp.	*3 05 P.M
No. 6 Indianapolis & Columbus Exp	9 50
No. 4 Columbus & Cincinnati Exp.	*3 20
No. 10 Wheeling Express	6 45
No. 14 Cincin New York fast line,	1 10 A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*7 30 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex	6 40
No. 3 Special St. Louis & Cin. Ex.	**1 40 P.M
No. 5 Night Express,	*6 40
No. 7 C. L. & W. and Galion Exp	4 30
No. 17 Spec. Col. Cin'ti. Exp.	1 20

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland & Pittsburgh.

The time given is the central standard time, thirty-three minutes slower than Cleveland time.

	DEPART	ARRIVE
Pittsburg & Wheeling	8 00 A.M	2 12 P.M
Express	2 00 P.M	6 25
Alliance Accommodation	3 15	9 50 A.M
Ravenna Accommoda	4 50	8 12
Night Express	†11 10 P.M	5 55 A.M
Newburg Accom'dation	10 30 A.M	11 40
Newburg Accom'dation	12 00 M.	1 20 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance. All other trains daily except Sunday.

"The Nickel Plate."

Ninetieth meridian time.

Going East.	ARRIVE.	DEPART
Buffalo Accom	10 22 a.m.	10 27 a.m.
Conneaut Accom	....	3 52 p.m.
Chicago Accom	9 02 p.m.	
Local Freight	11 36 p.m.	12 17 p.m.
Going West.	**ARRIVE.**	**DEPART.**
Chicago Accom	.....	6 47 a.m.
Conneaut Accom	8 57 a.m.	
Bellevue Accom	4 52 p.m.	4 57 p.m.
Local Freight	12 44 p.m.	1 22 p.m.

Rocky River Accommodation departs 5 52 a.m.; 1 47 p.m.

Euclid Accommodation departs 7 02 a.m.; 11 42 p.m., 5 17 p.m,

‖All trains daily except Sunday.

New York, Pennsylvania & Ohio.

New standard central, or Ninetieth meridian time, 33 minutes slower than Cleveland city time.

DEPARTURES.	a.m.	p.m.
N. Y. & Pitts. Express	* 6 50	‖ 1 00
Youngstown & Pitts. Ac	10 35	....
Fast N. Y. & Pitts. Express	"	* 2 20
Mahoning Accommodation		4 10
N. Y. and Pitts. Express		11 00
ARRIVALS.	**a.m.**	**p.m.**
New York Express	* 6 15	....
Mahoning Valley Ac	10 20	....
Fast N. Y. & Pitts. Ex	....	* 1 05
N. Y. & Pittsburgh Ex	....	* 6 30
Youngstown & Pitts. Ac	....	9 45

* Sunday trains.

Valley Railway.

Central Standard time.

	ARRIVE.	DEPART
Wheeling Junction	9 47 A.M	8 02 A.M
Canton	1 07 P.M	5 47 P.M
Wheeling Junction	5 47 P.M	2 52 P.M

Special trains leave on Sunday at 3.50 P.M., arriving at Cleveland at 6.42 P.M.
Depot foot of South Water Street.

Connotton Valley Railway.

Standard Time.

Trains arrive:	A. M.	P. M.
Canton, Sherrodsville & Coshc'ton.	9 47	7 07
Canton & Coshocton		1 02
Kent accommodation	7 37	

Newburgh 7:02 a. m., 8:32 a. m. 1:52 p. m., 4:17 p.m., 6:42 p. m., 10:07 p.m.

Trains leave Cleveland,	A. M.	P. M.
Canton, Coshocton & Sherrodsville	7 02	
Canton & Sherrodsville		3 07
Canton & Coshocton	7 02	3 42
Kent accommodation		5 12

Cleveland and Newburgh, 6:12 a. m., 7:47 a.m., 10:32 a.m., 2:52 p.m., 5:52 p.m., 5:12 p.m.
Newburgh and Bedford 10:32 p.m.
Trains Sunday only depart for Bedford 8:07 p.m., 10:07 a.m., 9:02 p.m.; Newburgh, 1:42 p.m.; Kent Accommodation 5:12 p.m.
Trains arrive, Kent Accommodation 7:37 p.m. Bedford 8:46 p.m., 1:27 p.m., 5:55 p.m.; Newburgh 2:32.
Depot corner Huron and Ontario streets.

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

Cleveland, Lorain & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	9 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	5 00 P.M

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect Nov. 18, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Conneaut Accom.
Lv. Chicago	7 47 am	.....	.....
Ar. Valparaiso	9 37	.....	.....
" Ft. Wayne	1 00 pm	.....	.....
" New Haven	1 35	.....	.....
" West Leipsic	3 45	.....	.....
" Arcadia	4 44	.....	.....
" Fostoria	4 57	.....	.....
" Gr. Springs	5 44	.....	.....
" Bellevue	6 12	.....	.....
Lv Bellevue	6 22	7 52 am	.....
Ar Lorain	7 50	9 16	.....
Ar Cleveland	9 02 pm	10 22	.....
Lv Cleveland	.....	10 27	3 52 pm
Ar Painesville	.....	11 33	5 05
" Ashtabula	.....	12 26 pm	6 03
" Conneaut	.....	1 07	6 32
" Erie	.....	2 09	.....
" Dunkirk	.....	3 47	.....
" Buffalo	.....	5 28	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ngr.	Con'eaut Accom.
Lv Buffalo	.....	9 47 am	.....
Ar Dunkirk	.....	11 24	.....
" Erie	.....	1 33 pm	Leave.
" Conneaut	.....	2 17	6 17 am
" Ashtabula	.....	2 50	6 46
" Painesville	.....	3 44	7 43
" Cleveland	.....	4 52	8 57
Lv Cleveland	6 47 am	4 57	.....
Ar Lorain	7 56	6 12	.....
Ar Bellevue	9 17	7 37	.....
Lv Bellevue	9 22	.....	.....
Ar Gr. Springs	9 44	.....	.....
" Fostoria	10 22	.....	.....
" Arcadia	10 34	.....	.....
" West Leipsic	11 30	.....	.....
" New Haven	1 35 pm	.....	.....
" Ft Wayne	1 52	.....	.....
" Valparaiso	5 55	.....	.....
" Chicago	7 52	.....	.....

Trains run by Ninetieth meridian time, which is nine minutes slower than Chicago time, twenty-eight minutes slower than Columbus time, thirty-three minutes slower than Cleveland time, forty-four minutes slower than Buffalo city time, and sixty minutes slower than Seventy-fifth meridian time.

For information, call on nearest Agent of the Company or address

B. F. HORNER,
Gen'l Passenger Agent.
LEWIS WILLIAMS,
General Manager, Cleveland O.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati, Indianapolis, Terre Haute and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.
A. J. Smith, Gen'l Pass. Agent, CLEVELAND, O

JOHN H. O'MARA,
NEW LISBON, OHIO,

Manufacturer of the celebrated
EXCELSIOR DIAMOND GRIT
GRINDSTONES
The best in the market

FOR WET AND DRY GRINDING,
AND FAST CUTTING.

Manufactured in sizes from 3 feet 6 inches to 8 feet in diameter; in thickness from 6 inches to 25 inches. Orders solicited.
82 JOHN H. O'MARA.

Blue Grass Route of Ohio

The Cleveland, Mt. Vernon and Delaware RAILROAD.

"Cleveland, Akron & Columbus."

In effect November 18, 1883, based on Central Standard Time.

GOING NORTH.

STATIONS.	No. 1.	No. 3	No. 5.	No. 7.
Leave				
Columbus	6 45	11 40	.....	16 50
Westerville	7 10	12 05	.....	17 18
Centerburg	7 52	12 47	.....	18 04
Mt. Vernon	8 37 B	13 31 D	.....	18 50 S
Gambier	8 49	13 41	.....	19 01
Danville	9 09	14 01	.....	19 23
Gann	9 21	14 11	.....	19 35
Millersburg	10 14	14 59	5 30am	.....
Fredricksb'g	10 37	15 19	5 51	.....
Orrville	11 12	15 50	6 50 B	.....
Warwick	11 26	16 11	7 16	.....
Clinton	11 42	16 16	7 23	.....
Akron	12 15	16 46	7 57	.....
Cuyahoga F's	12 30	16 58	8 11	.....
Hudson	12 50	17 15	8 30	.....
Ar. Clevel'd	11 12	18 25	9 50	.....

GOING SOUTH.

	No. 2	No. 4.	No. 6.	No. 10.
Leave.				
Cleveland	8 00	14 00	15 15	16 50
Hudson	9 17	5 10	16 30	18 15
Cuyahoga F's.	9 35	15 28	16 54	18 50
Akron	9 51	15 44	17 11	19 45
Clinton	10 22	16 16	17 43	.....
Warwick	10 26	16 21	17 48	.....
Orrville	10 51	16 47	18 14	.....
Fredricksburg	11 22	17 18	18 48	.....
Millersburg	11 45	17 40	19 10	No. 8.
Gann	12 32	18 30	.....	5 50
Danville	12 44	18 41	.....	6 02
Gambier	13 04	19 01	.....	6 21
Mt. Vernon	13 29 D	19 26 S	.....	6 50 B
Centerburg	14 01	20 00	.....	7 23
Westerville	14 45	20 45	.....	8 13
Columbus arr.	15 10	21 10	.....	8 40

The system used in the above table consists in avoiding the confusing division of the day into two equal portions of 12 hours each, and employing instead a continuous count from 1 to 24. The days begins at Midnight, as under the common system, but there is no possibility of confusion between the forenoon and afternoon hours.

E. T. JEFFERIS,
Gen. Pass Ag't, Columbus, O.
GEO. D. WALKER, RECEIVER.
N. MONSARRAT, Gen'l Supt.

New York, Pennsylvania and Ohio Railroad.

New York, Boston and the East.

The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast.

Central or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct as follows:

6 50A.M. LIGHTNINGEXPRESS(daily) sleepingand hotel coaches from Leavittsburg 8:35 a.m. To New York, Albany and Boston without change. Arrives at Meadville 10:40 a.m., (dinner); Franklin, 12:08 p.m. Oil City, 12:30 p.m.; Corry, 12: 5 p.m.; Jamestown, (Lake Chatauqua) 1:35 p. m.; Buffalo, 5:50 p. m.; Rochester, 8:20 p.m.; Hornellsville, 6:00 p. m.; (supper); Corning, 7:25 p.m.; Elmira, 8:05 p.m.; Binghampton, 10:05 p.m.; Albany, 5:20 a.m.; Boston, 1:45 p.m.; arriving at New York, 6:15 a.m.

2:20P.M. LIMITED EXPRESS, Pullman Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:30 p m.; Jamestown, 8:47 p. m.; Salamanca, 9:45 p. m.; New York, 10:10 a. m.

11:00 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown, 1:50 a.m.; Pittsburgh, 5:50 a. m.; Washington 6:00 a. m. Baltimore 00:00 p. m.; Meadville, 3:25 a. m. Corry, 4:59 a.m.; Jamestown, 5:57 a.m.; Buffalo, 9:20 a.m.; Rochester, 12:58 p. m.; Hornellsville 11:00 a.m.; Corning, 12:07 p. m.; Elmira 12:40 p. m.; Binghampton, 2:19 p.m.; New York 9:10 p.m.

2:20 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:02 p.m.; Washington, 7:09 a.m.; Baltimore, 8:19 a m

4:10 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 6:55 p.m; Sharon, 8:01 p.m; Sharpsville 8:10 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 00:00 p. m.

6:50 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:30 a.m.; Sharon, 10:30 a.m.; Sharpsville, 10:40 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:15 a.m., 7:45 a.m., and 12:55 p. m. and 8:45 p.m.

10:35 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:30 p.m.; Pittsburgh, 5:45 p.m. Trains arrive at Cleveland, 6:15 a.m., 6:30 p. m., 10:30 a.m 1:05 p.m., and 9:45 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS,
J. M. FERRIS, Gen. Man'gr, Cleveland. Pass. Agt., 131 Bank st., Cleveland.

THE Improved "Climax" Reversible Ice Creeper.

PATENTED APRIL 30, 1878.

Childs, Groff & Co., Manfrs.

CLEVELAND, OHIO.

Perfect Safety Secured in Walking on Ice or Slippery Pavements.

"A" represents the Creeper in position ready for use. The dotted line "B" shows the Creeper thrown back entirely out of the way when not in use, or walking in-doors.

This Creeper has advantages over all others.

Its simplicity of construction, being easily adjusted, always ready for use, and when not needed can be instantly turned under the "Shank" out of the way, therefore not interfering with walking in the house on carpets, etc. When in position for walking on ice it is a sure protection from falling.

Can be ordered at manufacturers' prices from

Biddle Hardware Co., Philadelphia. **Henry Brooks & Co., Boston.**
Peck & Snyder, New York. 63

Garry Iron Roofing Co.

The Largest Manufacturersof Iron Roofing in the World.

Manufacturers of all kinds of **IRON ROOFING** CRIMPED AND CORRUGATED SIDING, Iron Tile or Shingles, Fire-Proof Doors, Shutters, etc.

IRON ORE PAINT AND CEMENT.

152 to 158 MERWIN ST., CLEVELAND, O.

Send for Circular and Price List No. 85. 8

Iron Shingles, Double Cap, Corrugated, Crimped, Bead.

MOSER & THOMPSON,

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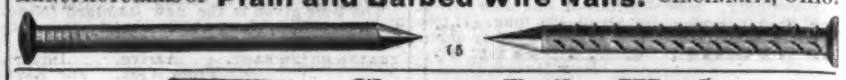

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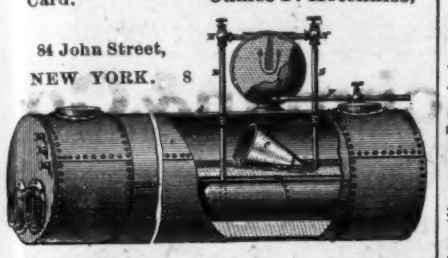

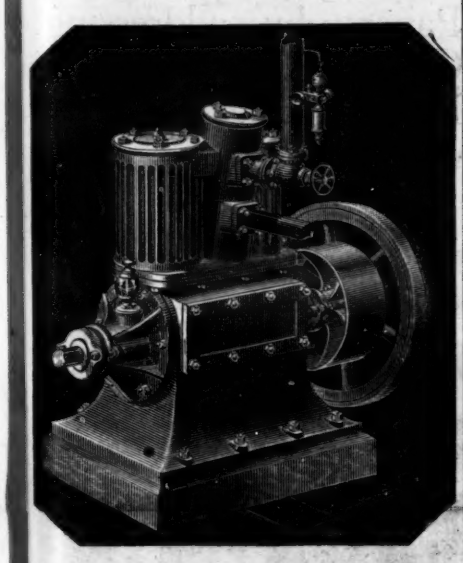

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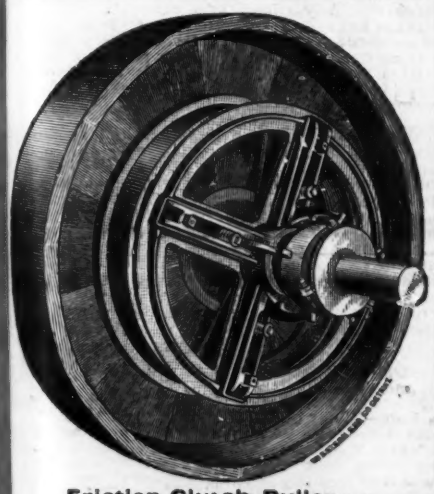

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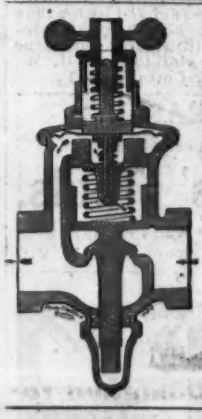

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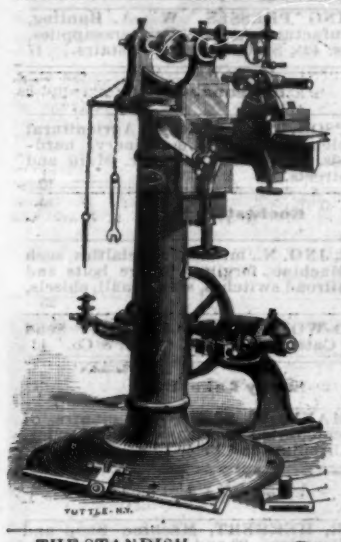

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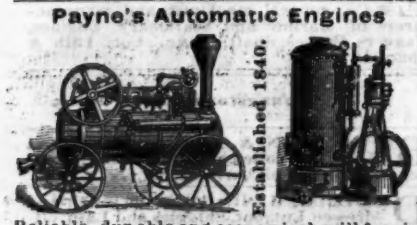

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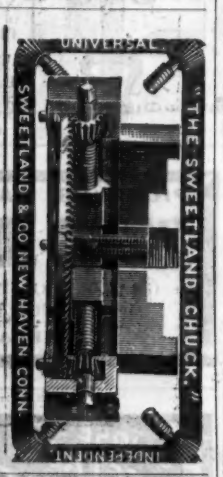

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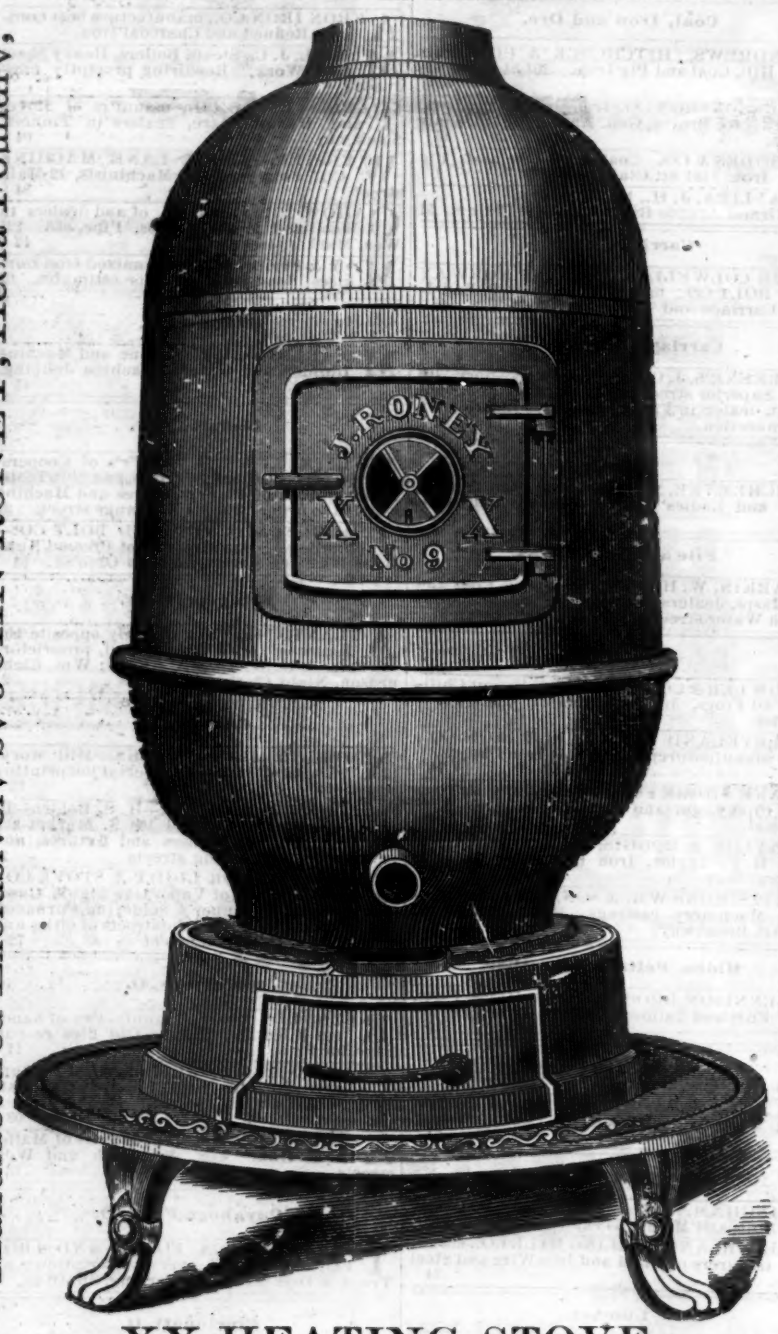

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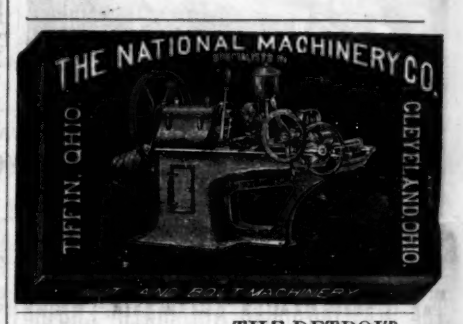

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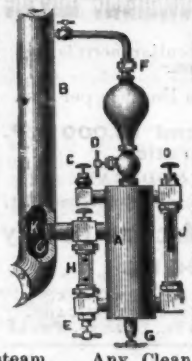

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Office 98 Griswold street, Detroit, Mich.

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